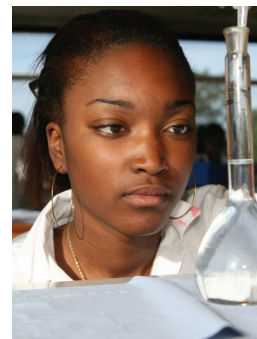
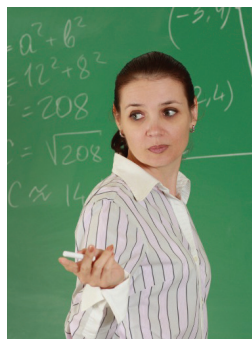


# The Mini-Symposium on Women of Color in Science, Technology, Engineering, and Mathematics (STEM):

A Summary of Events, Findings, and Suggestions

October 27-28, 2009, Arlington, VA



**A Report to the Committee on Equal Opportunities in Science and Engineering (CEOSE)**

**Submitted by Maria (Mia) Ong, Ph.D.**

CEOSE Member and Principal Investigator, Education Research Collaborative, TERC

*This material is based upon work supported by the National Science Foundation under Grant No. 0953861. It is co-sponsored by TERC, the American Chemical Society (ACS), and Dr. Phoebe Leboy on behalf of the Association for Women in Science (AWIS).*

## Acknowledgments

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Thank you to all of the speakers, moderators, co-planners, and attendees who helped to make the Mini-Symposium a memorable and invaluable event. The Organizing Committee is especially grateful to members of TERC (Frank Davis, Nira Voss, Ken Mayer, Cori Mykoff, Roberta Levy, Kevin Macauley, Kacy Karlen, Sneha Veeragoudar Harrell), ACS (Joseph Francisco, Constance Thompson, Katherine Hoffman, René Wade, Alicia Harris), NSF (Tyeshia Roberson, Denita Norris, Steven Buhneing), and the Hilton Arlington staff who dedicated their time and efforts to ensure the success of the event.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

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Row 1: Attendees registering; TERC Staff (Mia Ong, Sneha Veeragoudar Harrell, Frank Davis and Lily Ko); Diana Marinez and Cora Marrett.  
Row 2: Jeanette Brown and Aziza Baccouche; Attendees during Panel 1 session.

## The Mini-Symposium on Women of Color in STEM

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Row 1: Joslyn Kravitz; Jacqui Falkenheim and Joan Burrelli; Attendees during Joan Burrelli's keynote address.  
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 Row 3: Maggie Chen; Patricia Campbell and Jolene Jesse; Clemencia Cosentino; Joan Herbers and Marcy Towns.  
 Row 4: Table of resources at the Mini-Symposium; Katie Blanding and Carl Person; Louise Edwards.

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# Executive Summary

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The Mini-Symposium on Women of Color in Science, Technology, Engineering, and Mathematics (STEM) took place in Arlington, VA, on October 27-28, 2009. Its goals were to advance the current state of knowledge about complex challenges that women of color encounter in STEM and suggest strategies for enabling them to excel and assume advanced positions.

The Mini-Symposium was a key opportunity for participants to share experiential knowledge and evidence-based findings, and to provide comments and suggestions about how the recruitment, retention, and advancement of women of color in STEM may be improved through research, practice, policy, and evaluation. A Suggestions List resulting from this conference was later presented to the Committee on Equal Opportunities in Science and Engineering (CEOSE), a Congressionally-mandated advisory committee to the National Science Foundation and Congress.

## Sponsorship and Organization

The Mini-Symposium was implemented by TERC and organized by Dr. Maria (Mia) Ong, Principal Investigator, Education Research Collaborative, TERC. The National Science Foundation (NSF) provided major funding through award number 0953861. Dr. Margaret E. M. Tolbert was the grant's program officer, and Dr. Evelyn Hammonds served as the Co-Chair of the event. Co-sponsors included TERC, the American Chemical Society, and Dr. Phoebe Leboy on behalf of the Association for Women in Science.

## Attendees

Speakers and participants consisted of African American, Native American, Hispanic/Latina, and Asian American women graduate students, postdoctoral fellows, junior and senior faculty, and junior and senior professionals in STEM disciplines. Staff from NSF and other federal STEM agencies attended, as did program leaders who serve to support women of color in STEM; policy experts and evaluation experts with an interest in diversity issues; and social science scholars who study factors that promote or hinder women of color in STEM education and careers.

## Speakers and Panels

The Mini-Symposium featured two keynote addresses, a synthesis report, presentations by four panels, and a closing session with summary remarks and a roundtable discussion. Speakers included:

- ▶ Joan S. Burrelli, Ph.D., Senior Analyst, Science Resources Statistics, NSF, who gave a keynote address on "Women of Color in STEM Education and Employment."
- ▶ Maria (Mia) Ong, Ph.D., Principal Investigator, TERC, who presented her findings from "'Inside the Double Bind' Synthesis Project: Empirical Research on Women of Color in STEM."
- ▶ Christina (Tina) M. Tchen, J.D., Director, Office of Public Engagement and Executive Director, Council on Women and Girls, The White House, who gave a second keynote address on "Addressing STEM Education and Careers Through the White House Council on Women and Girls."

- ▶ Shirley M. Malcom, Ph.D., Head of the Directorate, Education and Human Resources Programs, American Association for the Advancement of Science, who gave the summary remarks.

The conference had four foci of discussion:

- ▶ The *Personal Perspectives* panel fostered an understanding of the complexities of inhabiting dual minority statuses in STEM.
- ▶ *Qualitative Findings* presented qualitative data about women of color on educational and professional paths in STEM, with a focus on understanding patterns among pathways taken.
- ▶ *Quantitative Research and Evaluation* included data from studies tracking and elucidating the experiences women of color in STEM.
- ▶ The final panel, *Policy and Action*, focused on actions, practices, and policies that are being implemented to help advance women of color to the top of STEM fields.

### **Suggestions to CEOSE**

Suggestions were collected by means of a closing roundtable session, in which participants worked in small groups to reflect on, discuss, and submit ideas. These initial suggestions were then refined by TERC and submitted to CEOSE in March 2010. The Suggestions List below is presented in greater detail on page 35 in the full report:

1. Increase funds for programs that help to augment the number and success of women of color in STEM fields.
2. Increase the knowledge base on women of color in STEM through more research, evaluations, and support for publishing.
3. Develop and support a centralized, digital clearinghouse of information about women of color in STEM.
4. Create and sustain a professional network for women of color in STEM.
5. Recognize that transitions represent the greatest points of loss of women of color from STEM fields; invest funds in studying transitions and implementing programs at transition points.
6. Hold grantees to greater accountability for meeting the NSF Broader Impacts criterion of broadening participation.
7. Give recognition awards to grantees who demonstrate outstanding work in broadening participation in STEM.
8. Protect the funding of and ensure the mentoring of minority and female graduate students, postdoctoral fellows, and junior faculty.
9. Support efforts to educate the public about the status of women of color, minorities, and women in STEM through citizen science efforts, informal science education, and other channels.

### **Further Outcomes**

The Suggestions List provides the basis for a set of recommendations from CEOSE to Congress on facilitating and enabling improvements in the status of women of color in STEM. These recommendations will appear in CEOSE's *2009-2010 Biennial Report to Congress*.

# Introduction

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The Mini-Symposium on Women of Color in Science, Technology, Engineering, and Mathematics (STEM) was held October 27-28, 2009 at the Hilton Arlington in Arlington, VA. It was implemented by TERC and organized by Dr. Maria (Mia) Ong, Principal Investigator, Education Research Collaborative, TERC. Major funding was provided by the National Science Foundation (NSF), and the event was co-sponsored by TERC, the American Chemical Society (ACS) and Dr. Phoebe Leboy on behalf of the Association for Women in Science (AWIS).

Dr. Evelyn Hammonds, CEOSE member and Harvard College Dean at Harvard University, served as the Mini-Symposium's Co-Chair. Dr. Margaret E. M. Tolbert, an NSF Senior Advisor and the Executive Liaison to CEOSE, was the program officer for the event. Dr. Muriel Poston, CEOSE Vice Chair and Dean of Faculty of Skidmore College, and Dr. Patricia Campbell, President of Campbell-Kibler Associates, Inc., served as Advisors to the Organizing Committee. The Assistant to the Organizing Committee was Ms. Lily Ko, Research and Administrative Assistant at TERC.

The original participation list was generated by CEOSE members, and the public were notified through dissemination of email, advertisements, and word-of-mouth. All registrants were accepted. A total of 117 persons registered; 114 persons attended. The complete event agenda is attached as Appendix A.

## Overview

The purpose of the Mini-Symposium on Women of Color in Science, Technology, Engineering, and Mathematics (STEM) was to provide opportunities for participants to:

1. Share their experiential knowledge and/or current evidence-based findings about women of color in STEM with CEOSE and the general STEM community; and
2. Provide comments and suggestions about how the recruitment, retention, and understanding about the experiences of women of color may be improved through research, practice, policy, and evaluation.

The Mini-Symposium acknowledged commonalities across all women of color in STEM, as well as unique aspects of races and ethnicities, disciplines, regions, and stages of life. Speakers and participants consisted of African American, Native American, Hispanic/Latina, and Asian American women who are graduate students, postdoctoral fellows, junior and senior faculty, and junior and senior professionals in industry and government in STEM disciplines.

Also speaking and in attendance were staff from NSF and other federal STEM agencies, program leaders who serve to support women of color in STEM, policy experts and evaluation experts with an interest in diversity issues, and social science scholars who specialize in studying factors that promote and hinder women of color in STEM education and careers. The four foci of discussion were: Personal Perspectives, Qualitative Findings, Quantitative Research and Evaluation, and Policy and Action.



### **Impetus for the Mini-Symposium**

Because of their race and gender, women of color who pursue advancement through the STEM fields are caught in a double bind. The challenges of living at the intersection between race and gender were first brought to national attention by Shirley M. Malcom, Paula Q. Hall, and Janet W. Brown, in their seminal 1976 American Association for the Advancement of Science report, *The Double Bind: The Price of Being a Minority Woman in Science*. The authors argued that the struggles to be scientists were greater for women of color than for white women or for men of color.

The persistently low numbers of women of color in STEM support this claim. In the three decades since publication of *The Double Bind*, women of color continue to be underrepresented at the advanced levels in most STEM fields. At the graduate level in 2006, women of color were severely underrepresented, collectively earning only 9.9% of all doctorates awarded in science and engineering while their representation in the general U.S. population (ages 25-44) was 16.4% (NSF, 2009; U.S. Census Bureau, 2009); also in 2006, female minority graduate students were outpaced by their minority male counterparts in fields such as physics, engineering, and mathematics. Furthermore, studies show that many women of color have been, and continue to be, stuck at junior-level positions, not advancing to leadership positions at the same pace as their male and white female counterparts.

As the U.S. demographics of higher education students nationwide rapidly shift towards becoming majority minority and majority female, minorities and women, and especially women of color, are widely considered to be untapped sources of domestic talent that could fill the country's current and future scientific workforce needs. Moreover, non-traditional students and workers bring to STEM culturally different knowledges and experiences that may be leveraged to innovatively solve complex problems.

It is timely, and perhaps imperative, that education and career efforts work to build the capacity of women of color to assume advanced STEM positions. The Mini-Symposium on Women of Color in STEM is one of these efforts. It was designed to bring together a unique configuration of experts to identify factors that sustain women of color through schooling and contribute to their educational and career success; and to recommend strategies to increase representation and advancement of this key demographic in STEM fields.

## Goals

There were several anticipated outcomes for the Mini-Symposium. The primary goals were to advance the current state of knowledge and understanding about what will support women of color in STEM fields to excel and assume advanced positions; and to contribute an improved understanding of the complex challenges that women of color encounter in STEM. It was intended to provide to CEOSE, and others, comments and suggestions about individual, programmatic, institutional, evaluation-based, and policy-related strategies that enable women of color to participate more fully and in greater numbers in their chosen STEM fields.

The Mini-Symposium also presented an opportunity to unite disparate knowledge about the individuals who traverse the double bind and the programs and institutions with which they interact; a secondary goal was to bring together women of color in STEM, and the researchers, administrators, and staff that promote them, to form a supportive community.

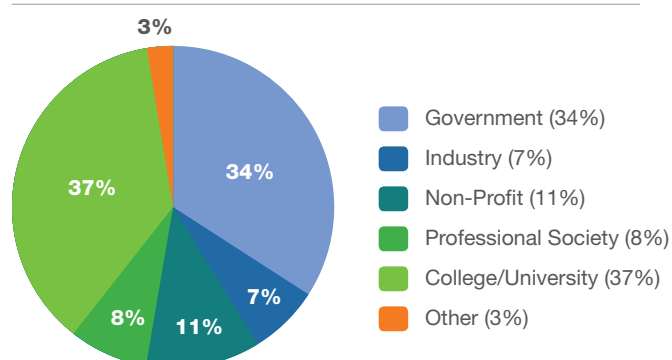
## Participant Demographics

The Mini-Symposium was pleased to host 114 attendees representing a wide variety of organizations, disciplines, and positions. Junior and mid-level academics and professionals participated in and presented at the conference, along with their senior counterparts. For example, among academics, 50% percent of attendees were junior or mid-level, creating numerous opportunities for mentoring.

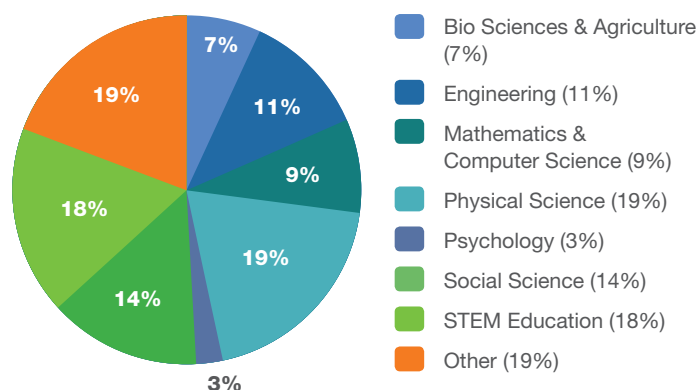
Sectors (Figure 1) represented included government, industry, non-profits, professional societies, national associations, universities, and independent organizations. Key institutions included the White House Office of Public Engagement, the White House Council on Women and Girls, National Science Foundation, U.S. Department of Energy, National Institutes of Health, U.S. Army, U.S. Navy, IBM, Dow Chemical, Institute for Higher Education Policy, National Academies, American Chemical Society, The Urban Institute, American Physical Society, SACNAS, Hispanic Association of Colleges and Universities; as well as 42 colleges and universities.

Disciplines (Figure 2) represented varied widely, including: Aeronautics, Physics, Computer Science, Latin@ Cultures, Science Education, Engineering, History of Science, Ophthalmology, Public Policy, Chemistry, Psychology, Biology, Sociology, Mathematics, Aerospace Physiology, Immunology, Astronomy, and Geosciences.

**Figure 1: Participants by Sector**

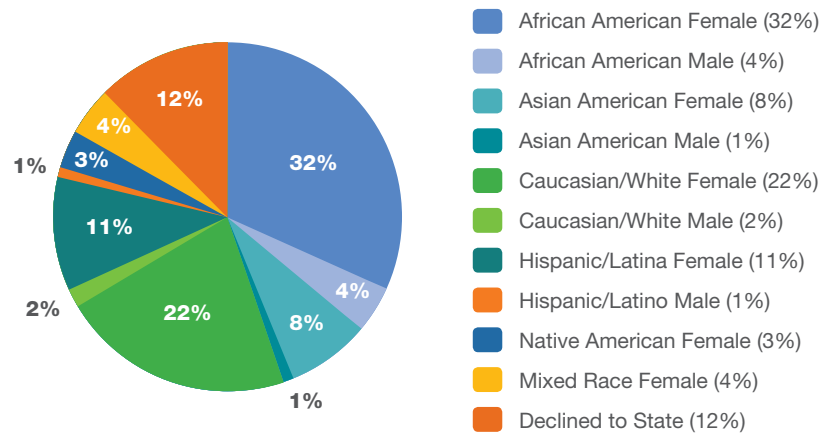


**Figure 2: Participants by Discipline**



Mini-Symposium participants represented both genders and a range of races and ethnicities (Figure 3).

**Figure 3: Participants by Race and Gender**



The pages that follow provide an overview of the speaker presentations and the responses of participants. The summaries exemplify the diversity of perspectives, the broad scope of ideas, and the high level of interest in new initiatives to improve the success of women of color in STEM that were in evidence at the Mini-Symposium.



# Mini-Symposium Day One: Presentations and Discussions

Day One opened with an introduction and welcome by members of CEOSE, followed by the first keynote address, Dr. Joan S. Burrelli's overview of the national statistics on women of color in STEM. Conference organizer and CEOSE member, Dr. Maria (Mia) Ong, then presented findings from a literature review of existing empirical research on women of color in STEM. Following these presentations were two panel sessions. The first panel, Personal Perspectives, was aimed at fostering an understanding of the qualitative complexities of inhabiting dual minority statuses in STEM. The second panel, Qualitative Findings, focused on key transitions for women of color in STEM, why their numbers have remained so low over the decades, and what individuals have found to foster success. The two presentations and the two panels were each followed by a moderated question and answer session. The sessions are detailed in the following pages.

## Introduction and Welcome

### Theresa A. Maldonado, Ph.D. (CEOSE Chair)

Associate Dean, Dwight Look College of Engineering, and Professor of Electrical and Computer Engineering, Texas A&M University, and Director, Energy Engineering Institute, Texas Engineering Experiment Station

Dr. Theresa A. Maldonado, CEOSE Chair, welcomed everyone and shared information on the history of CEOSE; its charge to examine issues regarding the broader participation of underrepresented minorities, women, and persons with disabilities; and the role of mini-symposia in helping CEOSE to collect in-depth information on key topics.



*"This is an area that has very little documented research and yet there is still a lot of interest in this area, so you are going to learn a lot."*

— Theresa Maldonado, Ph.D.

### Evelynn M. Hammonds, Ph.D. (CEOSE Member)

Dean of Harvard College and Barbara Gutmann Rosenkrantz Professor of Science and African and African American Studies, Harvard University

Dr. Evelyn M. Hammonds, acknowledged the conference organizers, introduced the time-keeper, and explained the procedure for comments, feedback, and moderated discussion following speaker presentations. She then introduced the keynote speaker, Joan S. Burrelli, Ph.D., Senior Analyst, Science Resources Statistics, at the National Science Foundation.



*"I would like to welcome you all to what I know is going to be a very inspiring conversation."*

— Evelyn Hammonds, Ph.D.



*"Like underrepresented minority men, [underrepresented minority] women are less likely than white or Asian men and women to graduate from high school, to attend college, and to graduate with a bachelor's degree. Like white women, underrepresented minority women are less likely to major in STEM fields or to be employed in STEM fields."*

— Joan Burrelli, Ph.D.

## Keynote Address: "Women of Color in STEM Education and Employment"

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### Joan S. Burrelli, Ph.D.

Senior Analyst, Science Resources Statistics, National Science Foundation

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/JoanBurrelliv2.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/JoanBurrelliv2.pdf)

**Read the full report:** <http://www.nsf.gov/statistics/wmpd/minwomen.cfm>

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Dr. Burrelli presented an overview of the national statistics on women of color in science and engineering. The data in her presentation were drawn from NSF's *Women, Minorities and Persons with Disabilities in Science and Engineering: 2009* web report, a historical and contemporary breakdown of education and employment data by sex and race/ethnicity. Highlights of the data follow.

The overall number of STEM bachelor's degrees awarded to men and women of almost all racial/ethnic groups has increased since 1977; the exception is American Indian/Alaska Native men, for whom the numbers remain largely unchanged. Within all racial/ethnic groups, men still earn a higher percentage of engineering and physical sciences bachelor's and doctoral degrees than women, while women earn a higher percentage of biological and social sciences bachelor's degrees and a higher percentage of social sciences doctoral degrees. Breaking out the representation of underrepresented minority women in biology versus physics reveals the true paucity of their participation in physics (and other non-biology STEM fields). Although Asian women are not considered underrepresented in STEM fields, they are the least likely of all scientists and engineers with Ph.D.s to receive tenure. Finally, whether a school is a top producer of underrepresented minority bachelor's in STEM may be determined by the school's region/location. From 2003-2007, the schools producing the largest numbers of Hispanic baccalaureate recipients in STEM were located in California, Texas, Florida, and Puerto Rico; black bachelor's degree awardees largely were in the South; and Native American bachelor's degree recipients were located largely in Oklahoma and the Southwest.

### Q & A:

Some key follow-up questions included: In the report, how are people of multiple racial backgrounds asked to classify themselves? To what degree do formulae and reporting methods serve to rigidify existing racial constructs? Can the numbers reveal the full story on barriers to success without including socioeconomic conditions? Participants also explored further explanations for attrition rates: losing STEM students to other majors or to overseas; and failure at the pre-college level to prepare students for success. Audience members requested more data on what is happening in government agencies and industry, and on the trajectory of Asian women in STEM careers.

## Synthesis Report: “Findings from the ‘Inside the Double Bind’ Synthesis Project: Empirical Research on Women of Color in STEM”

**Maria (Mia) Ong, Ph.D. (CEOSE Member)**

Principal Investigator, TERC

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/MiaOng.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/MiaOng.pdf)

The literature review was undertaken to attempt to answer the question, “What empirical knowledge do we already have about women in STEM?” It included published or unpublished empirical works produced between 1970 and 2008 pertaining to US-born Asian and underrepresented minority women in higher education and/or on career trajectories in STEM. Dr. Ong’s team utilized a wide range of search terms and collection methods and selected works involving the intersection of race and gender. The total for inclusion was 114 works, highlighting the limited research base and a strong need for more systematic data collection, especially at the advanced career level.

Findings at the undergraduate level reveal the importance of student-faculty relationships and positive peer experiences in formal retention programs; the push-pull factor of family life; and indications that students often use racial identity and personal agency to navigate both racism and the rigors of the STEM environment. At the graduate level, social climate and isolation are dominant themes, with funding, role models, and mentors playing key roles in persistence in STEM. At the career level, racial dynamics impact upward mobility, and women of color experience significant gaps in family-work balance. Recommended future actions include: funding for STEM enrichment programs that specifically target young women of color; hosting a National Academies Dinner to bring together STEM students and top women of color professionals; and implementing programs that encourage researchers to publish findings on minority women in STEM. Dr. Ong encouraged increased studies on women of color in STEM and offered a detailed research agenda to guide interested researchers.

### **Q & A:**

Discussion ranged from the relevance of funding to persistence in STEM; to interest in re-interviewing the original *Double Bind* participants; to the difference in social environment between minority-serving schools and large research institutions. However, most discussion focused on mentoring and role models: how to reduce the cost of and build capacity for mentoring; whether a tenure process can value and reward mentoring commitments; the degree to which the presence of underrepresented minority faculty improves retention; and whether mentors need to match the race and gender of the people they serve.



*“We found many, many dissertations. When I asked my researcher to find out how many had been published, what they had published, the answer came back zero. I asked somebody else to do the same research; the answer came back as zero. There’s not a knowledge gap. It’s a serious gap in publishing, in being able to get the word out.”*

— Mia Ong, Ph.D.



## Panel 1: Personal Perspectives

This panel included five women of color with higher degrees in STEM fields. They shared their perspectives on their journeys, failures, and successes. They discussed challenges faced by others on similar paths and reflected on potential policy implications. Each provided potential action steps for better supporting underrepresented women and girls entering STEM.



*"I have to remember my Navajo background—being matrilineal and knowing my role. I am confident in that and in who I am. I need to pass it on to others who may not have the same confidence. I walk in beauty. It's a tough road being beauty-minded when you are in battles, dealing with people who do not respect you...."*

— Sandra Begay-Campbell,  
M.S.

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### ***"Walking in Beauty on an Ever-Changing Path"***

#### **Sandra Begay-Campbell, M.S. (CEOSE Member)**

Principal Member of the Technical Staff, Sandia National Laboratories

As a young Navajo woman, Ms. Begay-Campbell was accustomed to a matrilineal society, in which she was respected and had a voice. Although a successful high school student, she experienced culture shock in her transition to her first choice college in Grand Rapids, MI; she had misconceptions about how she would be treated outside of her community and suffered from a lack of respect and support. She returned home, thriving at a community college, where she was supported by family, friends, and invested professors. This environment helped facilitate her success in civil engineering, resulting in a full scholarship to Stanford University for graduate studies; her evolution into a leader in the field of engineering; and a role as a trustee at the University of New Mexico, raising endowment funds for Native American women.

Ms. Begay-Campbell emphasized the importance of family and community, and of staying connected to one's core values, while navigating a professional system that often does not show respect for women of color or believe they have earned the right to be where they are. She views her race and culture as a source of confidence that equips her to better mentor and guide young women on similar paths. Looking ahead to future challenges, she noted that women in leadership roles and seeking certain levels of attainment will need to stay grounded in their own definitions of success and quality of life, and not let their life goals be driven or defined by the systems in which they operate.

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***“Motivating Latinas in STEM: Obstacles and Opportunities,  
a Personal Perspective”***

**Elsa Ruiz, Ph.D.**

Assistant Professor, Interdisciplinary Teaching and Learning, University of Texas at San Antonio

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/ElsaRuiz.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/ElsaRuiz.pdf)

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Dr. Ruiz grew up in a barrio in a family of 11 children, with limited English skills and financial resources, yet went on to graduate from high school and earn a Ph.D. in mathematics education. She credits her success to her parents placing a high value on education and instilling a love of learning. She also had a role model—an older sister who obtained a Ph.D.—and access to the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), where she interacted with successful scientists.

Dr. Ruiz presented statistics on Latinas in STEM in terms of degree of attainment and participation in STEM fields. They continue to lag behind Latino males in all STEM fields except biological sciences, and the proportion of Latinas drops at each level of attainment. She explained how success in STEM careers begins at the pre-college level, where Latinas must be better motivated to learn mathematics. Some top barriers to early success in mathematics and science include: teachers lacking necessary tools, content knowledge, and culturally competent teaching methods; schools lacking understanding of the expectations on Latinas at home; a lack of role models in STEM; Latinas’ home language not being valued in schools; and home environments that do not foster good concentration and study skills. Dr. Ruiz’s suggestions to help build Latina success in STEM include: intervention programs for the prevention of Latina high school drop-outs; professional development in culturally competent pedagogy and stronger mathematics and science content knowledge; tutoring to support Latinas in the rigorous classes that lead to graduate degrees in STEM; and fostering greater respect for Latina culture and the contributions Latinas have made.

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***“A Graduate Student’s Chosen Path to a Science Career”***

**Ivy Krystal Jones, M.S.**

Doctoral Research Student, Physics, Hampton University

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/IvyKrystalJonesv2.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/IvyKrystalJonesv2.pdf)

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Ms. Jones presented on her evolving education and her successes as a woman of color in a science career. Coming from a working class background, Ms. Jones was schooled at Montessori and in the Chicago Public School System. She then attended an all-white Catholic high school where she experienced changes in her social life due to her race. However, she lived in a community that supported her dedication to her schooling, including her science club, and her parents were determined that she



*“I urge you that we do not ignore the benefits and advantages of educating Latinas in STEM fields... The success of our country will also depend on the success of the 66 million future wise Latinas waiting to enter college.”*

— Elsa Ruiz, Ph.D.



*“If she can send a letter [of encouragement] like that to little old me, maybe I can be like her one day.”*

— Ivy Krystal Jones, M.S.

would attend college. In her senior year of high school, Dr. Margaret E. M. Tolbert, appearing as a role model and a voice of confidence, wrote her a letter to encourage her attendance at Tuskegee University. Dr. Tolbert continues to mentor Ms. Jones to this day.

Ms. Jones successfully completed her B.A. and three Master's degrees (in Biotechnology, Mechanical Engineering, and Physics); summer school programs and workshops; fellowships with the Virginia Space Grant Consortium and Alabama Graduate Research Scholar Program; and internships with the Jet Propulsion Laboratory and Howard Nanoscale Science and Engineering Facility. She is currently a doctoral candidate and has already been approached with potential employment opportunities in both government and industry. She looks forward to achieving her Ph.D. so that she can positively impact her community and give back. She has witnessed a critical need to bring diverse and unique approaches to STEM fields, which can be accomplished by assisting other women and girls of color to participate in STEM and by providing them with research opportunities to contribute to the STEM body of knowledge.



*"For Asians in general, there is a reduction in participation as you go up the academic ladder—and it's quite noticeable."*

— Lilian Wu, Ph.D.

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### ***"Asian Women in STEM Careers: A Forgotten Minority with a Glass Ceiling?"***

**Lilian S. Wu, Ph.D.**

Program Executive, Global University Programs, IBM Corporation

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Dr. Wu shared data and reflections on levels of attainment for Asian American women in STEM fields and in higher education in general. Although Asian Americans are not "underrepresented" in STEM, there is a reduction in participation the higher up the professional ladder one goes. She noted that Asian women are amongst the lowest in terms of holding full-time or tenured positions in academic ladders; Asian Americans make up less than 1% of college presidents; and at National Institutes of Health, Asians comprise 21.5% of tenure-track researchers but only 4.7% of lab or branch chiefs. For doctorate holders at universities and four-year colleges, the likelihood of being at a high rank is low for Asian Americans and low for women; this makes the number of Asian American women in the higher ranks very small.

Dr. Wu proposed possible reasons why Asian American and Asian women in academics tend to be found in the lower-ranked, postdoctoral, "supporting" roles: communication issues due to language and cultural differences (for those born outside the U.S.); and stereotyping of Asians as "quiet" and "perfect for the lab," rather than as leaders. She indicated that there may be different ways of thinking about success within Asian cultures, and that Asian American STEM students may need more explicit education about what it takes to succeed in the fast-moving, fast-paced setting of academia and industry. At the career level, she advocated for mentoring as a path to fostering diversity within organizations and explained that mentoring helped her reach her current level of success.



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### ***“Women of Color in Computing”***

#### **Valerie E. Taylor, Ph.D.**

Department Head, Computer Science and Engineering and Royce E. Wisenbaker Professor, Texas A&M University

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/ValerieTaylorv2.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/ValerieTaylorv2.pdf)

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Dr. Taylor shared her personal journey, from growing up in an education-oriented family to becoming a department head at Texas A&M. She described her perspective on issues faced by women of color in STEM professions, primarily isolation (being “the only” or having just a few others who look like her) and the resulting self-doubt from (lack of role models). She also discussed taxation—being asked to represent both women and minorities on committees and in other settings—and the resulting misunderstandings that can occur when asked to address only gender or only race, rather than their intersection.

She recommended three strategies for success for women of color: networking, creating role models, and “being yourself.” Two kinds of informal networking are equally important: “blending in” (with those in power, typically white males) and “sticking together” (with those of similar background and experiences); as well as being clear about goals and protecting one’s time to avoid being overtaxed. Creating role models requires increasing the low numbers of women of color in academia, so that students do not go through their entire programs without being taught or mentored by anyone who looks like them. Women of color need to be mentored through the tenure process and promoted to work in academia to increase presence. Lastly, women of color need to recognize that who they are is *good* enough. She encouraged allowing yourself to be known by others; setting aside time to identify passions; valuing emotional intelligence; and using personal experiences to create better environments.

### **Panel 1 Q & A**

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#### **Moderator: Audrey Ellerbee, Ph.D.**

Postdoctoral Fellow, Chemistry and Chemical Biology, Harvard University

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Participants reflected, made comments, asked questions, and shared experiences of their own. One noticeable comment was that many of the panelists had talked about being lucky or stumbling into their current positions. They were urged not to diminish their own accomplishments, and panelists discussed ways of coping with “imposter syndrome.” Other feedback was wide-ranging and touched on: challenges faced by women of color participating in women’s science and engineering organizations; the value of disaggregating data on women’s participation by ethnicity; why there is cultural competency and publishing support for internationals but not for domestic women of color; how certain cultural characteristics (determination, self-reliance, faith) may shape persistence and success in graduate programs; what culturally



*“I think it’s a myth that you must be like a white male to succeed. I think you can be yourself. I learned over time that being myself was darn good. So I am myself.”*

— Valerie Taylor, Ph.D.



*“Helping women of color achieve representative parity in STEM really requires a constant vigilance.”*

— Audrey Ellerbee, Ph.D.

competent high school science teaching and tools look like; and learning to succeed as yourself in a diverse and nurturing environment versus learning to access power and resources in a white, male-dominated STEM arena. The critical need for more peer-reviewed publications and more readily available data was emphasized again, with participants noting that being able to cite sources and articulate data about underrepresentation elevates their credibility when pushing forward on issues like cultural isolation or barriers to success.

## Panel 2: Qualitative Findings

The second panel presented qualitative data about experiences of women of color as they navigate educational and professional paths in STEM. The focus was on understanding patterns among pathways taken in order to translate them into better policies and practices. Highlights included discussions of two key transitions in underrepresented minority women's STEM education journeys—between community colleges and four-year institutions and between minority-serving undergraduate colleges and graduate schools.



*"[Students] talked about community college classrooms being breeding grounds for interest in the sciences, while university lecture halls act as weeding grounds to relieve impacted majors."*

— Marie-Elena Reyes, M.S.

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### ***"Unique Challenges for Women of Color in STEM Transferring from Community Colleges to University"***

#### **Marie-Elena Reyes, M.S.**

Coordinator, Instituto de Agua y Cultura: Water Institute for the Northern Rio Grande, University of New Mexico – Taos, and President and Founder, Frida Kahlo Institute for Women at the Borderlands

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/Marie-ElenaReyes.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/Marie-ElenaReyes.pdf)

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Ms. Reyes discussed the role that community colleges play as a STEM gateway for underrepresented minorities. Historically, community colleges have been corridors for women and students of color entering higher education. Forty-four percent of STEM graduates report having attended community college at some point, however, there appear to be high attrition rates for community college transfers during their first year at university (although unconventional timelines and educational paths complicate this picture somewhat).

Ms. Reyes presented data available on women of color transfer students in STEM showing that they face the common "double bind" challenges of being minority and female, as well as a host of other dilemmas. These include: being singled out or shut out because they are older; managing extended social and financial responsibilities off campus; lacking strong social networks on campus and missing access to student resources; being unfamiliar with the rules of competitive academic environments (curve-grading, high out-of-class study time, the "weeding out" mentality); and the resulting pressure to manage conflicting priorities and expectations. The data also show that once transfer students get through their first year of university, they typically are able to complete their education and enter STEM careers. She recommended active recruitment of women of color students at community colleges, funding first-year transition programs (mentoring, work-life balance, etc.); funding

research opportunities targeted to this population; creating leadership development workshops; and running pedagogy workshops for STEM faculty on best practices for working with women of color transfer students.

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***“From One Culture to Another”***

**Joretta Joseph, Ed.D.**

Program Administrator and Graduate Advisor, National Physical Science Consortium

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/JorettaJoseph.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/JorettaJoseph.pdf)

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Dr. Joseph presented on the experiences of six African American women pursuing graduate degrees in mathematics and chemistry at predominantly white research institutions. Significant differences in cultural norms between Historically Black Colleges and Universities (HBCUs) and graduate programs impact women of color pursuing higher STEM degrees. In the experience of the study subjects, graduate programs’ norms are regulated at the department rather than school-wide level, creating a less community-oriented and supportive environment. Professors and staff are significantly less proactive about fostering students academically, providing positive feedback, and helping them navigate the system and access resources. As women of color they were excluded from study groups and had limited social interactions. They expected to succeed academically, but discovered they were missing key technical skills or courses.

Personal determination was imperative to the success of these students. They paid for private tutors and located outside mentors. Their education was a personal commitment to broaden their horizons, rather than just a career path. Not all students succeed by these methods. Women of color transitioning from minority-serving colleges need better support, especially in the first year. Colleges need to cultivate ties to larger institutions and government agencies, to foster more contact with graduate school cultures and to provide research and internship opportunities. Graduate schools could institute peer mentoring to help students navigate their new environment; use summer bridge programs to acquaint new students with faculty, campuses, and cultural norms and to help build critical peer relationships; and motivate staff and faculty to take a more proactive role and create a more welcoming atmosphere.



*“Attention must be paid to the perception of a successful scientist, so that it becomes an inclusive concept.”*

— Joretta Joseph, Ed.D.



*"There is a saying from [Machado] in Spanish, 'Traveler, there is no path. You make it as you walk it.' All of us in this room have made that path, and we have walked it. It makes it easier for those that come after us."*

— Norma Cantú, Ph.D.

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***"Getting There Cuando No Hay Camino:  
Chicanas in Mathematics, Science and Engineering"***

**Norma Cantú, Ph.D.**

Professor, English and U.S. Latin@ Literatures, University of Texas at San Antonio

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct27/NormaCantu.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct27/NormaCantu.pdf)

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*Paths to Discovery: Autobiographies from Chicanas with Careers in Mathematics, Science and Engineering* (2007) emerged from Dr. Cantú's work using the practice of *testimonio*, or life story, to document the conditions of Latinas in academia. The collection of autobiographical narratives chronicle paths to achievement and reveal key obstacles for ten Chicana professionals in STEM who have defied the "master narrative" (that they should be poor, unsuccessful, pregnant at 16, etc.) and helped other women succeed as well. Of note is the significant influence of their families and communities, especially having supportive mothers who allowed experimentation and ambition. Each had teachers and mentors, from the K-12 level, who inspired, encouraged, and opened doors. Another interesting commonality was their each being able to read for pleasure in English from a young age. Each faced race, class, and gender bias from teachers and colleagues throughout their schooling and careers, and learned to negotiate those obstacles, to be taken seriously and to be considered an equal.

Some policy implications that can be culled from their stories include: the need for content-based, culturally relevant teacher training at the K-12 level; creative programs to provide more educational access and opportunities; greater recruitment to and support in graduate schools; and transitional programs to help students ease into graduate studies. Dr. Cantú encouraged that this *testimonio* project be replicated as part of a sustained effort to increase the number of Latinas and Chicanas in STEM. By sharing stories, women create a roadmap, marking pitfalls and routes of success, that can be use to guide those coming next.



## Panel 2 Q & A

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### Moderator: Alex Ramirez, Ph.D. (CEOSE Member)

Executive Director, Information Technology Initiatives, Hispanic Association of Colleges and Universities (HACU)

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Four primary issues were discussed during the Q & A: publishing, articulation agreements, the role of all women colleges, and how to embed culture in science teaching and bring science into the culture. Barriers to dissertation publishing may include lack of time and resources for manuscript preparation, especially for those in research labs (priority is on locating the next grant), at teaching intensive colleges (priority is on large teaching load), or who moved directly into a full-time job. Leadership workshops in publishing, with input from the journals, could bring women together to work on writing, submitting, handling rejection, and accessing resources. All-women colleges were compared to HBCUs in terms of providing a nurturing environment and producing women graduates in STEM. HBCUs were seen as more beneficial for women of color, due to greater diversity and culturally relevant teaching. The need for reform and better clarity in articulation agreements (official agreements designed to help students transition to four-year institutions by matching coursework between schools) was raised; community college students also need greater guidance to navigate the transfer system and plan their course loads strategically to avoid wasting time and money. Ideas were also shared on the importance of making culture understood and valued as an asset in STEM programs, and of taking culturally relevant science and mathematics out into communities.

### Evening Reception

Day One concluded with an evening reception at The Front Page restaurant in Arlington, Virginia. The reception was sponsored by the American Chemical Society (ACS) and served as a networking venue for all participants. Brief remarks were given by Dr. Joseph S. Francisco, CEOSE Member, William E. Moore Distinguished Professor of Earth and Atmospheric Sciences and Chemistry at Purdue University, and President Elect of the American Chemical Society; and by Janet Bryant, MBA, Principal Scientist and Technology Deployment Manager at Pacific Northwest National Laboratory, Department of Energy.



*"We need to get a better understanding of these [pathways]... so we can translate these into better policies and practices."*

— Alex Ramirez, Ph.D.



*"This workshop is your time to stand up and make your voice be heard. You have a responsibility to the young girls who view you as role models and who will go down the same road as you."*

— Joseph Francisco, Ph.D.



Janet Bryant, MBA



Row 1: Tyeshia Roberson; Angela Kelly; Panel 1 (Lilian Wu, Ivy Krystal Jones, Elsa Ruiz, Sandra Begay-Campbell and Audrey Ellerbee).  
 Row 2: Alex Ramirez and Joretta Joseph; Jeannette Brown; Lance Haworth; Jessie DeAro.  
 Row 3: Jeannette Brown, Suzanne Singer, Janet Bryant, Susan Butts; Beverly Hartline; Narcrisa Norman.  
 Row 4: Sheila Lange; Gloria Thomas and Arlene Knowles; Muriel Poston and Theresa Maldonado; Lisa Frehill.

Photos by Choice Photography, courtesy of the American Chemical Society.



# Mini-Symposium Day Two: Presentations and Discussions

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The second day opened with a welcome from Dr. Cora B. Marrett, Acting Deputy Director of the National Science Foundation. The third panel, Quantitative Research and Evaluation, described findings from studies aimed at tracking representation and elucidating experiences of women of color in STEM. The final panel, Policy and Action, focused on actions, practices, and policies that are being implemented to help advance women of color to the top of STEM fields. Following these panels, Christina M. Tchen, J.D., Director of the Office of Public Engagement and Executive Director of the Council on Women and Girls for The White House, presented a keynote address. Dr. Shirley M. Malcom then gave remarks on future directions for actions in research, programs, and policy. The two panels and two presentations were each followed by a moderated question and answer session. The Mini-Symposium concluded with a Roundtable Session, in which all attendees were invited to discuss and give written suggestions on how to advance the status of women of color in STEM. Details of each session are in the following pages.

## Introduction and Welcome to Day Two

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### **Cora B. Marrett, Ph.D.**

Deputy Director (Acting), National Science Foundation

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Dr. Cora Marrett, Acting Deputy Director of the National Science Foundation, welcomed everyone and acknowledged the conference organizers and sponsors. She reflected on the original *Double Bind* report as one of the first efforts to bring together women of color in science and engineering and to recognize that minority status and gender status cannot be untwined. When CEOSE was originally established by Congress in 1981, such distinctions between gender and race, women and minorities, were prevalent; but there has been good progress since that time in recognizing the key significance of the intersections. The Mini-Symposium serves as a good opportunity to reflect on recent developments for women of color in STEM and to identify critical action steps for the future. She reminded participants that they had been brought together with a purpose: to provide concrete input based on their experiences to CEOSE so that it can best advise on what must be done to move forward. Lastly, she introduced Dr. Muriel Poston, CEOSE Vice Chair, Dean of the Faculty and Professor of Biology at Skidmore College, who would moderate the first panel of the day.



*"We are not just here to say, 'This is a nice gathering.' We are asking for the profound input that all of you can have in identifying the kinds of things that must be a part of the agenda, and how we must, together, move forward for achieving what we must accomplish. "*

— Cora Marrett, Ph.D.

### Panel 3: Quantitative Research and Evaluation

The third panel presented a variety of data about both the tracking and supporting of women of color in STEM, in order to better understand obstacles and improve participation. Panelists touched on data about mentoring experiences for women of color; representation of underrepresented minority women in STEM at top 50 STEM departments between 2002 and 2007; and the types and comparability of data that are available for tracking women of color's participation in STEM.



*"I wanted to know, were we doing as good a job serving women of color as we were the majority women? That's something every program ought to be asking."*

— Carol Muller, Ph.D.

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#### ***"Learning from the Experiences of Women of Color in MentorNet's One-on-One Program"***

**Carol Muller, Ph.D.**

President, Blue Sky Consulting and Founder, MentorNet

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/CarolMuller.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/CarolMuller.pdf)

**Full MentorNet report:** <http://www.mentornet.net/files/WomenofColorFinalReportMay2004.pdf>

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Dr. Muller shared findings of an evaluation that was conducted for MentorNet, a national online mentoring tool that supports diversity in science and engineering. The evaluation found statistically significant differences in perceived needs and benefits between women of color mentees and white mentees. More women of color wanted to discuss issues of race or ethnicity with mentors, while African American students, in particular, wanted same-race mentors. However, most mentees highly rated their mentoring experience regardless of race pairings. While some research indicates that students can greatly benefit from same-race, or at least culturally competent, mentoring, these findings point to the need to broaden thinking about what mentoring is and how students may benefit from having multiple mentors.

Mentoring needs to vary widely and may include role models (seeing someone who looks like oneself doing the job), psychosocial support, "cultural capital" (learning, otherwise unspoken, practices and protocols for success), sponsorship, or some combination of these. Satisfaction depends upon the mentees' individual mentoring needs and goes beyond ethnicity or gender-pairing. While, for some students, same-race mentoring is crucial, overall, having multiple mentors who can each serve an area of need for the student may be more beneficial and may alleviate some of the undue burden on the limited number of women of color mentors available. Students should also be encouraged to clarify and articulate their mentoring needs and objectives. Dr. Muller recommended researched-based professional development to provide coaching and a common language, for fostering fluency in the sensitive topic of racial difference, especially for cross-race mentoring pairs.

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***“Science & Engineering Faculty, 2002-2007:  
Are the National Tactics Achieving the Goal?”***

**Donna J. Nelson, Ph.D.**

Associate Professor, Chemistry, University of Oklahoma

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/DonnaNelson.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/DonnaNelson.pdf)

**Final reports and data tables:** <http://chem.ou.edu/~djn/djn.html>

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The Nelson Diversity surveys track representation of women through the STEM academic pipeline. Dr. Nelson’s data are obtained from department chairs in the top 50 departments in 14 disciplines, and are disaggregated by race, ethnicity, gender and rank. Her surveys obtain full populations instead of samples, which is critical when looking at minority women because the numbers are so small. She presented data from 2002 and 2007 on the representation of women and underrepresented minority faculty over a five-year time period. First was the change in percentages of women, white men, blacks, Hispanics, and Native Americans. Only women and Asians had consistent, significant increases across all fields. Percent increases for blacks and Hispanics were small and inconsistent across fields, with an overall increase of only 1%-2% for five years—“not good enough.” The presence of Native Americans was negligible.

Moving on to a key demographic, Dr. Nelson presented departmental head counts of underrepresented women of color. Between 2002 and 2007, counts remained in the single digits. Chemistry changed from 1 black female, 5 Hispanic females, and 1 Native American female to 3 black females, 9 Hispanic females, and 0 Native American females. Computer science increased from 0 to 6 underrepresented minority women. Mathematics increased from 2 black females and 7 Hispanic females to 4 black and 9 Hispanic, with 8 non-U.S. born. Very few U.S.-born minority women achieved full professorship in STEM in those five years, with most stuck at the assistant level. Dr. Nelson acknowledged that the data are discouraging and show insignificant progress towards full representation.



*“At this rate of change we are not going to reach full representation. I think it’s important to see this change in a five-year time period. It’s depressing, but you need to see it to understand what the challenges are.”*

— Donna Nelson, Ph.D.





Lisa Frehill, Ph.D.



*"The goal of this project is to encourage discussion among professional societies that lead to common standards in data collection and reporting... We also want to generate awareness that professional society data are available among users of data."*

— Rachel Ivie, Ph.D.



*"We heard about... the need for having different levels of expertise at different points in time, individuals that can tell them where the soft places are in the ground and how to traverse them."*

— Muriel Poston, Ph.D.

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## **"Professional Society Data"**

**Lisa Frehill, Ph.D.**

Executive Director, Commission on Professionals in Science and Technology  
and

**Rachel Ivie, Ph.D.**

Assistant Director, Statistical Research Center, American Institute of Physics

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/Rachellvie.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/Rachellvie.pdf)

**Sample professional societies' questionnaires and reports:**

<http://www.cpst.org/advance1.cfm>

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Dr. Lisa Frehill and Dr. Rachel Ivie presented data on methodologies by which professional societies collect and report information on women of color faculty in STEM. They discussed how disparate methods inhibit comparison of numbers, representation, employment, and attainment across disciplines. Of the 54 professional societies they contacted, only 11 surveyed their membership—with 4 surveying individuals and 7 surveying departments. Individual surveys are inherently incomplete, because there are few existing lists of professionals who should be contacted, and they exclude non-members. Departmental surveys can create misinformation about race demographics, because they require one person to answer questions about race and ethnicity on behalf of others. Departments also frequently turn in only aggregated data.

The surveys themselves differ in how societies ask about background (what race options are given; whether they are allowed to check more than one box, whether "Hispanic" is categorized under race or under ethnicity, etc.) and in how they ask about field of employment. Other societies do not survey at all, but rather provide information from their membership databases or directories. There is also no standardization in the reporting of the data—tables, graphs, data sets, etc. vary widely, making simple comparative analysis difficult. Some societies do not report their data at all. The researchers hope to encourage discussion among professional societies that will lead to common standards in data collection and reporting; and to generate awareness of this data to institutions that are trying to transform their faculties.

## **Panel 3 Q & A**

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**Moderator: Muriel Poston, Ph.D. (CEOSE Vice Chair)**

Dean of the Faculty and Professor of Biology, Skidmore College

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Many participants expressed their gratitude for the data presented and indicated how compelling the numbers were. The first question asked was, how can the data be used to inspire our institutions to actually change? It was recommended to publicize the numbers as much as possible. The more the data are available, the harder it will be to ignore the problem. Commenters asked how to locate or track more women of color in industry, at the national laboratories (DOE, NOA, NIST, etc.), and working in international fields outside the U.S. Some data on industry are

available, but they are aggregated and not easy to break down to the individual level. Similarly, the government has some broad data on the national labs, and the Department of Defense currently plans to do a more detailed study. There is not much data available on international fields such as astronomy and astrophysics because longitudinal studies are so expensive, but there is a push to do them and get some good data. Finally, there was further discussion of the true importance of same-race mentoring, based on the MentorNet data. Dr. Muller clarified that although a student may prefer a same-race mentor, actually, multiple mentors are required to ensure that the depth and breadth of mentoring needs are met.

## Panel 4: Policy and Action

The Policy and Action panelists described current and upcoming programs and made policy suggestions designed to help women of color to excel and assume advanced positions. Some themes among the recommended action steps include networking, mentoring, professional development, and publishing.

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### ***“AWIS Science Career Network for Women of Color”***

#### **Patrice O. Yarbough, Ph.D.**

Senior Scientist, Division of Space Life Sciences,  
Universities Space Research Association

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/PatriceYarbough.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/PatriceYarbough.pdf)

Dr. Yarbough, Chair of the Diversity Task Force of the Association for Women in Science (AWIS), presented AWIS's proposal for preventing the attrition of young women of color out of science careers and for moving them into highly visible positions. Current data indicate that more young females of color are entering the education pipeline, but that not enough of them are reaching the highest career levels. The proportion of Ph.D. recipients is lower than it should be—based on representation in the general population—with only about 7% of the advanced degrees in science and engineering being earned by underrepresented minority women. The proportion of women faculty is low, with little progress made in the last 15 years, and is considerably lower for underrepresented minority women.

AWIS proposes to establish a mentoring and career network of women of color in STEM. Mentees would be matched with others of similar interests and goals into small groups for peer contact. AWIS members would serve as mentors and become available to the incoming generation of women in the early stages of their careers. The program would include online coaching sessions on leadership, career transitions, work-life balance, and more, plus an annual retreat. Success of the network would be measured by the number of women who continue to participate in the program over time, longitudinal tracking of mentee employment data, and the number of mentees becoming full AWIS members. This national network would strive to decrease losses of young women and support them to reach their highest potential.



*“It’s very important that women of color have career positions with high visibility, so that the message can be sent that not only can we educate women of color, but we can also employ those same women of color.”*

— Patrice Yarbough, Ph.D.



*"Everyone wanted to know who the other Latinas were, but they weren't networking with each other."*

— Leticia Cano, Ph.D.



*"I was not a happy camper as a young faculty member. [Other young, minority female professors and I] shared heartaches over the phone. I didn't want anybody to have to go through what I went through."*

— Christine Grant, Ph.D.

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### ***"Personal Latina Postdoctoral Experiences and Social Networking"***

**Leticia Cano, Ph.D.**

Postdoctoral Fellow, Microbiology and Immunology, School of Medicine, University of Nevada

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/LeticiaCano.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/LeticiaCano.pdf)

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Dr. Cano studies natural killer cells in autoimmune diseases in the School of Medicine at the University of Nevada in Reno. She shared key experiences on her postdoctoral path that helped to hone her expertise and her strategic use of data, and that grounded her work in its value to the community. While studying rare diseases at NIH, she began looking for other Latinas like herself. Joining the AWIS Diversity Task Force, she used their database and her own contacts to launch her first network for Latina graduates, postdocs, and professionals using LinkedIn. She has now started her second network, Latina Scientist, using both LinkedIn and Facebook.

She learned that a key issue for Latinas is feeling isolated—not having anyone to speak to about their experiences and handling their problems alone. In terms of using online networking for support, there was a level of discomfort with initiating communication; that is, a hesitancy to contact people, even those from reputable institutions, from out of the blue. With the Latina community so diverse, participants often preferred to associate with women from their country of origin, adding a layer of complexity to the networking. Although Dr. Cano actively matched peers based on fields of study and country of origin, participants were slow to network. She encouraged that more work be done to build effective networking opportunities for minority women, and to develop workshops on diversity within diverse groups and reward systems for participation in diversity activities.

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### ***"ADVANCE-ENG with PURPOSE: Grand Challenges and Great Solutions"***

**Christine Grant, Ph.D.**

Associate Dean for Faculty Development, College of Engineering, North Carolina State University

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/ChristineGrantv2.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/ChristineGrantv2.pdf)

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Dr. Grant presented information on three Peer Mentoring/Professional Development Summits that she organized through an NSF ADVANCE Leadership Grant. She is the Executive Director of the Promoting Underrepresented Presence on Science and Engineering Faculties Institute (PURPOSE). Her inspiration for the summits came from her own experiences of isolation and her desire to cultivate a more effective system of mentoring and support for underrepresented minority women faculty.

The first summit, in 2007, was held for over 60 women in Raleigh, NC. It focused on cross-cultural mentoring and the role of top 50 institutions—what it means to be from the top 50, and whether it is okay not to be top 50. The second summit in 2009 hosted 30 senior engineering faculty members. It fostered a supportive environment

for this overtaxed demographic and helped create a strong peer leadership mentoring network. CalTech hosted the third summit in 2009, welcoming women from 20 colleges and universities. Designed to pass on wisdom from the senior women to the junior ranks, it featured active mentoring, interactive sessions, and a President's roundtable. The summits have cultivated a network of peers in the academy, celebrating accomplishments, sharing strategies for success, and encouraging achievement. In the future, Dr. Grant hopes to see strategic partnerships with top 50 schools and minority-serving institutions, and to find a permanent home for the summits to promote them and to help locate further funding.

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***“Collaborative Career Development Project for Women of Color”***

**Claudia Rankins, Ph.D.**

Program Director, HBCU-UP, Education and Human Resources, National Science Foundation

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/ClaudiaRankins.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/ClaudiaRankins.pdf)

Dr. Rankins described the Collaborative Career Development Project (CCDP) for Women of Color, which she is developing with Dr. Kelly Mack and Dr. Monya Ruffin. Dr. Rankins and her colleagues have identified certain key issues for women of color in the academy. These include health equity (the disproportionate burden of disease incidence for African American women), civic engagement (a high need among underrepresented minority students and a means of reducing isolation), and culturally competent mentoring (shown to be uniquely effective for underrepresented groups). The CCDP is an action plan that will address those concerns, as well as pay equity.

The CCDP will promote national awareness of issues for women of color in academics, industry, and informal science education; develop channels for broad dissemination of relevant information; and create a formal venue for professional development. A two-day conclave will be held in June 2010 in Washington, DC as a forum for analyzing data related to women of color in the context of current societal conditions. It will result in the dissemination of qualitative data through a collection of scholarly works by participants, to be published in an anthology. The conclave will also be a tool to establish targeted professional development programs for women at all institutions of higher education. It will be an important step towards the final goal of establishing a national society for women of color in STEM.



*“I have two very personal reasons for being involved and interested in this issue. They are my two granddaughters who are African-American, and what I want for them is to have it easier than their other Grandma, who when she was a grad student in math at the University of Virginia, had to live in a dorm by herself, because she was not allowed to socialize with the white students.”*

— Claudia Rankins, Ph.D.



*“A Science of Broadening Participation would enable us to make progress... Until we do, we will see only the policies that reflect the 1970’s adage... ‘All the women are white, and all the blacks are men.’”*

— Kellina Craig-Henderson, Ph.D.

## Panel 4 Q & A

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### Moderator: Kellina Craig-Henderson, Ph.D.

Program Director, BCS, Social, Behavioral and Economic Sciences, National Science Foundation

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/KelliCraigHenderson.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/KelliCraigHenderson.pdf)

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Prior to moderating the Q & A session, Dr. Craig-Henderson presented on the NSF’s efforts to develop a Science of Broadening Participation research program. She indicated that meaningful educational and organizational policy recommendations need to be based on a volume of empirical research. The Science of Broadening Participation Program would sponsor social science research that advances understanding of the causes and effects of progress and barriers to broadening participation in STEM at all levels. It would address the shortage of evidence-based information about what works and what doesn’t work and help organize existing but disparate findings into a cohesive body of knowledge. The Science of Broadening Participation would be inherently multi-disciplinary, marshalling findings across fields including economics, social psychology, education, linguistics, and anthropology. The program would enable researchers across disciplines who are working to answer these questions to communicate more effectively with one another. It would also put social science researchers in communication with natural and physical scientists who may not be aware of the available empirical data, providing them with support and a stronger knowledge base as they work to broaden participation on a local level.

As with the previous panel, this Q & A featured a number of questions from audience members about how individuals can be tracked once they leave graduate programs. The Science of Broadening Participation has potential to fund some of these longitudinal studies. Some data in this area do already exist, but they are not always mined and reported. Also, tracking is a two-way street—surveyors require respondents. Conference participants were urged to respond to phone calls and surveys; without a high response rate, collected data cannot be reported. One commenter followed up on the subject of compensation, noting that the salary gap is a systemic problem and that part of working to change our institutions should include making sure employers are paying fair wages. Other topics included: ideas for how small institutions help minority women connect to others like themselves around the country; questions about how multi-racial and biracial individuals are accounted for in the data; and suggestions for requiring principal investigators to include mentoring plans for women of color when applying for money in relevant categories.



## Keynote Address: “Addressing STEM Education and Careers Through the White House Council on Women and Girls”

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### Christina (Tina) M. Tchen, J.D.

Director, Office of Public Engagement and Executive Director, Council on Women and Girls, The White House

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Ms. Tchen described current White House initiatives to help ensure that women and minorities participate in the expansion of STEM by citing President Obama’s emphasis that science education is vital to the future of our country. In 2010, the Administration is investing 3.7 billion dollars in STEM programs and using funds from the Recovery Act to modernize K-12 school labs. The President is striving to reinvigorate the image of science through informal science activities, such as his phone call to the Space Shuttle, and has set for NSF the goal of tripling the number of research fellows in science and engineering. The President further seeks to develop an economy that will be maintained through clean energy, a clean environment, and sustainable investments in technology, education and industry. The current work that is being done to bolster the science fields through the inclusion of women and minorities is critically important to meeting that challenge.

Ms. Tchen affirmed that the country cannot make strides in STEM development without focusing on underrepresented populations. Drawing on examples from the legal profession, the military, and corporate investing, she demonstrated that diversity secures the best talent, and that diverse viewpoints create the best problem solving. She also referenced the current national conversation about women’s challenges to balance childbearing with career advancement. Through the creation of the Council on Women and Girls and other steps, the Administration hopes to push forward the conversation about issues such as flexible schedules, paid family leave, dependent care time, and extending the tenure clock. Other commitments to women include creating affordable healthcare for postdoctoral fellows; creating fairness to women in their health care coverage options; and enforcing Title IX.

### Q & A

In response to questions, Ms. Tchen discussed, at length, the “singling out” dilemma: how to put in place special programming critical to removing barriers, without over-defining genders or ethnicities, and without invoking the negative connotations of “affirmative action.” For example, the Council on Women and Girls must make family leave policies gender-neutral in their application, while noting that they specifically address women’s needs and are advantageous to women’s careers. Also discussed were the dangers of “post-racial” thinking in light of the lack of progress or reversal of progress seen in recent years. Ms. Tchen and participants touched on the work of American Association for the Advancement of Science (AAAS) and the White House in guiding agencies and universities in terms of recruitment and retention of women of color and in how to make special programs legally-sustainable following the impact of the Adarand and Michigan cases.



*“This is just the beginning of what we must accomplish. The reason the President emphasizes science is not because he thinks science is cool or that kids think it’s cool, but because it is vitally important to the future of our country.”*

— Tina Tchen, J.D.



*"You have to be in the discussion in order to help move it in a particular way."*

— Shirley Malcom, Ph.D.

## Summary Remarks

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### **Shirley M. Malcom, Ph.D.**

Head of the Directorate, Education and Human Resources Programs, American Association for the Advancement of Science (AAAS)

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Dr. Malcom's remarks encompassed many of the topics raised during the conference. She returned often to the themes of leadership and policy-making. She disagreed with the idea that more data are needed in order to inform policy. Policy should come first, and then more data later to inform it. That is how Title IX worked for women graduates of medical school—the policy was changed, the ceiling removed, and the numbers dramatically increased. She encouraged participants to find new ways to leverage existing data to foster change, and she emphasized the importance of diversifying leadership—because leaders set the rules and make the policy. NSF's broader Impacts was mentioned as a policy that has made positive changes in how people look at their work and funding. However, Dr. Malcom stressed the need for greater accountability and fidelity to grantees' Broader Impacts statements. This could potentially involve regular Broader Impacts audits, which would set higher expectations, as well as monitoring the use of funds.

Further topics included imposter syndrome; the unfortunate zero-sum thinking of supporting girls versus supporting boys; the importance of getting to know the different federal agency cultures; finding a balance between celebrating the community's diversity and determining what core elements are held in common; and reframing ideas of community and work with the arrival of new technologies. In closing, Dr. Malcom pointed to the primary task ahead: to concretely show how diversity does, in fact, make a difference in the science, mathematics, and engineering that is being done.

### **Q & A**

Follow-up focused primarily on the value of a potential audit of Criterion 2/ Broadening Participation within Broader Impacts. Several audience members indicated that there should be some degree of auditing, that grantees should have to include it in their annual reports, and that universities should be held to their word in this area if they want to receive or continue to receive NSF funds. CEOSE is already looking at this with the National Science Board. CEOSE could give recognition awards to grantees with outstanding Broader Impacts pieces—to provide incentive and to clarify performance expectations. Other topics raised include: folding cultural competency and nondiscrimination into existing science ethics courses; whether institutions are beginning to understand the importance of diversity; and how data on women and minorities are valuable for determining how anyone becomes successful and how to make it happen for everyone.

## Introduction to Roundtable Session and Collection of Suggestions

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### **Margaret E. M. Tolbert, Ph.D. (CEOSE Executive Liaison)**

Senior Advisor, Office of Integrative Activities/Office of the Director,  
National Science Foundation

**View online:** [http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women\\_of\\_color\\_stem\\_Oct2009/Oct28/MargaretTolbertv2.pdf](http://www.nsf.gov/od/oia/activities/ceose/mini-symp-pres/Women_of_color_stem_Oct2009/Oct28/MargaretTolbertv2.pdf)

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Dr. Tolbert introduced the Roundtable Session and charged participants with their assignment to provide comments and suggestions on facilitating and enabling improvements in the status of women of color in STEM. She explained the process by which the suggestions would make their way to the National Science Foundation. All suggestions will be collected by TERC, compiled and condensed by theme, and disseminated to members of CEOSE as well as the American Chemical Society, other Mini-Symposium sponsors, and members of the STEM community. CEOSE, in turn, will look at the suggestions, refine the compilation into recommendations, and make a presentation to the Director of the National Science Foundation. Following Dr. Tolbert's introduction, the participants—organized primarily by role or interest (policy, STEM practice, social science, and higher education)—worked in small groups to discuss, write, and submit their suggestions. Suggestions resulting from this roundtable session are detailed in the Suggestions to CEOSE section starting on page 35.



*"Remember, the aim of this event is to provide comments and suggestions... the effort is to facilitate and enable improvements in the status of women of color in STEM."*

— Margaret Tolbert, Ph.D.

## Closing Remarks

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### **Theresa A. Maldonado, Ph.D. (CEOSE Chair)**

Associate Dean, Dwight Look College of Engineering, and Professor of Electrical and Computer Engineering, Texas A&M University, and Director, Energy Engineering Institute, Texas Engineering Experiment Station

Dr. Maldonado thanked everyone for attending and expressed her appreciation to all speakers and attendees. She made a special request that everyone exchange contact information and find one another through the social networks in order to stay connected, reduce isolation, and continue mentoring one another. She directed everyone to the CEOSE website for follow up information from the Mini-Symposium.



*"I challenge the current CEOSE committee to be a little bit more pushy."*

— Theresa Maldonado, Ph.D.





Row 1: Akilah Moore; Samuel Myers and Evelyn Hammonds; Suzanne Schaefer; April Hodari and Lorelle Espinosa.

Row 2: CEOSE Members (Margaret Tolbert, Sandra Begay-Campbell, Alex Ramirez, Mia Ong, Muriel Poston, Marigold Linton and Theresa Maldonado); Chanda Prescod-Weinstein; Claudia Rankins and Monya Ruffin.

Row 3: Jong-on Hahm; Shirley Malcom; Margaret Tolbert and Tina Tchen; Debra Yniguez.

Row 4: Brandeis Marshall; Alicia Lanz; ACS Members (Denise Creech, Mamie Moy, Gloria Thomas, Jeannette Brown, Ingrid Montes, Janet Bryant, Joseph Francisco, Susan Butts and Donna Nelson).

Photos by Choice Photography, courtesy of the American Chemical Society.

# Evaluation

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Conference participants were asked to complete evaluation surveys of the Mini-Symposium to help gauge effectiveness of the event and potential outcomes. The responses were compiled and evaluated by Judy Storeygard, Project Evaluator for TERC. They include ratings of the symposium as a whole, ratings for individual sessions, conference outcomes, and suggestions to increase the usefulness of future events like the Mini-Symposium. The full Evaluation Report is attached as Appendix B.

## Suggestions to CEOSE

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The following suggestions were distilled from the full list of suggestions submitted by Mini-Symposium participants during the Roundtable Session. TERC first compiled the suggestions and sorted them by general theme. Then, the suggestions were further refined by popularity, relevance to women of color, and their appropriateness to the charge of CEOSE. Suggestions 1 through 5 specifically target and benefit women of color in STEM. Suggestions 6 through 9 benefit women of color in STEM, but are not specific to this population.

### **1. Increase funds for programs that help to augment the number and success of women of color in STEM fields.**

- ▶ Undergraduate research opportunities for women of color in STEM.
- ▶ Graduate and postdoctoral fellowships in STEM fields where women of color are most underrepresented: physics, astronomy, computer science, and some areas of engineering.
- ▶ Workshops and conferences for critical stakeholders (i.e. professional societies, university department chairs in STEM, honor societies) to discuss preparation of underrepresented minority women for employment and share evidence-based best practices.
- ▶ Programs that teach the culturally competent mentoring of women of color in STEM.
- ▶ Funding for smaller institutions to bring senior women of color faculty and professionals to speak and mentor on campus.
- ▶ Professional development programs for women of color on writing and publishing, as well as grant money and protected time for underrepresented minority women to write and publish.
- ▶ Professional development programs on entrepreneurial skills-building (interviewing, salary negotiation, proposal submissions) targeting women of color to help them develop tools they need to reach parity with white males.
- ▶ Leadership workshops for women of color in STEM.
- ▶ Collaborations between NSF and other agencies to increase funding for initiatives that improve representation of women of color in STEM.



**2. Increase the knowledge base on women of color in STEM through more research, evaluations, and support for publishing. Possible topics include:**

- ▶ Assessment of the current levels of inclusion for women of color in STEM across all sectors—academic, industry, and government.
- ▶ Reports of disaggregated racial/ethnic and gender data at all educational and career levels.
- ▶ Investigation of how institutional policy and practices create additional barriers for women of color; research on the drop-off in women of color's participation in tenure-track academic positions in STEM fields.
- ▶ Investigation of how to institutionalize promotion or tenure systems that reward and recognize the additional burden of service to communities of color (through mentoring, serving on committees, etc.).
- ▶ Reports on the numbers and success of women of color in STEM industry (longitudinal tracking, professional society data, etc.).
- ▶ Translational research on women of color in STEM to stimulate academy-industry partnerships.
- ▶ Re-examination of *The Double Bind* findings to determine what progress has been made and what issues remain.
- ▶ Diversity within the diversity: examination of experiences of women of sub-groups of racial cultures (i.e. African Americans vs. immigrant Africans) in STEM education and employment.

In addition, increase funding for:

- ▶ Capacity-building and consultant-hiring to mine data from existing programs.
- ▶ Publishing and dissemination of empirical research on the experiences of women of color in STEM.

**3. Develop and support a centralized, digital clearinghouse of information about women of color in STEM, which would include:**

- ▶ Data on representation and participation.
- ▶ Research done by and about women of color in STEM.
- ▶ Programs providing opportunities and grants.
- ▶ Organizations that provide professional development and networking opportunities.
- ▶ Information on mentoring opportunities.
- ▶ Data contributed by professional societies and informal science organizations.
- ▶ Search-fed capabilities so other organizations can add information and links.

**4. Create and sustain a professional network for women of color in STEM.**

- ▶ Build and support national in-person and virtual networks among women of color in STEM. A model for this could be Ford Foundation Fellowships, which give awardees lifelong access to conferences, networks, mentoring, and other opportunities.
- ▶ Create and sustain regional efforts to open dialogues on issues relevant to women of color in STEM on college campuses.
- ▶ Create and sustain regional efforts to open dialogues on issues relevant to women of color in STEM in professional societies.

**5. Recognize that transitions represent the greatest points of loss of women of color from STEM fields; invest funds in studying transitions and implementing programs at transition points. Key transition points include:**

- ▶ Transferring from community colleges to four-year institutions.
  - Fund research and evaluations on understanding causes of drop-off and drop-out rates.
  - Fund first-year transition programs (mentoring, peer-mentoring, orientation, leadership development workshops).
  - Fund research opportunities targeted to transfer students.
  - Fund pedagogy workshops for STEM faculty on best practices for working with women of color transfer students.
- ▶ Transitioning from small, minority-serving undergraduate institutions to graduate programs at large research institutions.
  - Fund research and evaluations on causes of drop-off and drop-out rates.
  - Fund summer bridge programs (peer-mentoring, orientation, leadership development workshops).
  - Fund programs that cultivate ties between MSIs and larger, predominantly white research institutions and government agencies.
  - Fund programs that develop effective mentoring for women of color in year one of graduate programs.

**6. Hold grantees to greater accountability for meeting the NSF's Broader Impacts criterion of broadening participation of underrepresented groups.**

- ▶ Set higher expectations for the quality of Broader Impacts statements: require proposers to indicate specific plans and evaluations for meeting the Broader Impacts criterion of broadening participation.
- ▶ In proposals, require a faculty recruitment and retention plan; in annual reports and final reports, require data and other evidence to demonstrate broadening participation.
- ▶ Put more weight on Broader Impacts through a tiered system of grant reviews. Proposers should provide evidence of meeting the Broader Impacts criterion of broadening participation in their prior NSF work.

- ▶ Tie funding to the strength of proposers' Broader Impacts statements; tie future funding to their past performance in meeting their Broader Impacts commitments.
- ▶ Restructure grant funding so that a portion is withheld until a follow-up report is submitted on how the Broader Impacts criterion is met.
- ▶ Encourage communication between grantees and Broader Impacts experts.
- ▶ Closely monitor use of funds; disallow reallocation of funds for Broader Impacts work to other categories.
- ▶ Charge committees with conducting Broader Impacts audits to ensure fidelity to grantees' Broader Impacts statements; publicly release audit results.
- ▶ Convene a conference on the outcome of the audits to develop conclusions on the effectiveness of the Broader Impacts requirements and develop recommendations for improvement.

**7. Give recognition awards to grantees who demonstrate outstanding work in broadening participation in STEM.**

**8. Protect the funding of and ensure the mentoring of minority and female graduate students, postdoctoral fellows, and junior faculty.**

- ▶ Audit the mentoring of postdoctoral fellows programs, including defining specific duties and their duration, requiring grant writing exposure, requiring professionalism, etc.
- ▶ Offer more funding for departments to support their women of color junior faculty to attend networking conferences.
- ▶ Do not allow reallocation of funds from graduate students for Principal Investigator travel or equipment.
- ▶ Allow only career proposals from assistant professors (already enforced by the NSF Engineering Directorate).

**9. Support efforts to educate the public about the status of women of color, minorities, and women in STEM through citizen science efforts, informal science education, and other channels.**

## References

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- Malcom, S. M., Hall, P. Q., & Brown, J. W. (1976). *The double bind: The price of being a minority woman in science* (Report No. 76-R-3). Washington, DC: American Association for the Advancement of Science.
- National Science Foundation. (2009). *Women, minorities, and persons with disabilities in science and engineering: 2009* (NSF 09-305). Arlington, VA: Author.
- U.S. Census Bureau. (2009). *National population estimates: Characteristics*. Retrieved January 29, 2009, from <http://www.census.gov/popest/national/asrh/NC-EST2005-asrh.html>

## Appendices

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### **Appendices follow in the next pages:**

- Appendix A: Full Agenda
- Appendix B: Evaluation Report
- Appendix C: Funder and Co-Sponsors
- Appendix D: Speaker Biographies

## Appendix A: Full Agenda

**Tuesday, October 27, 2009**

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### TIME

### TOPIC

**10:30 AM**

**Registration Opens**

**12:00-1:15 PM**

**LUNCHEON**

#### **Welcome & Introduction**

**Theresa A. Maldonado, Ph.D. (CEOSE Chair)**

Associate Dean, Dwight Look College of Engineering  
and Professor of Electrical and Computer Engineering  
Texas A&M University and  
Director, Energy Engineering Institute  
Texas Engineering Experiment Station

**Evelynn M. Hammonds, Ph.D. (CEOSE Member)**

Dean of Harvard College  
and Barbara Gutmann Rosenkrantz Professor of History  
of Science and of African and African American Studies  
Harvard University

#### **Special Moderator to the Mini-Symposium**

**Patricia B. Campbell, Ph.D.**

President  
Campbell-Kibler Associates, Inc.

#### **Keynote Address**

***Women of Color in STEM Education  
and Employment***

**Joan S. Burrelli, Ph.D.**

Senior Analyst, Science Resources Statistics  
National Science Foundation

#### **Moderator**

**Evelynn M. Hammonds, Ph.D.**



## AFTERNOON SESSION

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**1:30-2:15 PM**

### **Synthesis Report**

*Findings from the “Inside the Double Bind”  
Synthesis Project: Empirical Research on  
Women of Color in STEM, 1970-2008*

**Maria (Mia) Ong, Ph.D. (CEOSE Member)**

Principal Investigator, Education Research Collaborative  
TERC

### **Moderator**

**Marigold Linton, Ph.D. (CEOSE Member)**

Director, American Indian Outreach  
University of Kansas

**2:45-4:30 PM**

### **Panel 1: Personal Perspectives**

*Walking in Beauty on an Ever-Changing Path –  
A Native Woman Engineer’s Perspective*

**Sandra Begay-Campbell, M.S. (CEOSE Member)**

Principal Member of the Technical Staff  
Sandia National Laboratories

*Latinas in STEM: Obstacles and Opportunities*

**Elsa Ruiz, Ph.D.**

Assistant Professor, Interdisciplinary Learning and  
Teaching  
University of Texas at San Antonio

*A Graduate Student’s Chosen Path to a  
Science Career*

**Ivy Krystal Jones, M.S.**

Doctoral Research Student, Physics  
Hampton University

*Asian Women in STEM Careers –  
A Forgotten Minority with a Glass Ceiling?*

**Lilian S. Wu, Ph.D.**

Program Executive, Global University Programs  
IBM Corporation

***Women of Color in Computing:  
A Personal Perspective***

**Valerie E. Taylor, Ph.D.**

Department Head, Computer Science and Engineering  
and Royce E. Wisenbaker Professor  
Texas A&M University

**Moderator**

**Audrey Ellerbee, Ph.D.**

Postdoctoral Fellow, Chemistry and Chemical Biology  
Harvard University

**4:45-6:00 PM**

**Panel 2: Qualitative Findings**

***Unique Challenges for Women of Color in STEM:  
Transferring from Community Colleges to  
University***

**Marie-Elena Reyes, M.S.**

Coordinator, Instituto de Agua y Cultura: Water Institute  
for the Northern Rio Grande  
University of New Mexico – Taos  
and President and Founder  
Frida Kahlo Institute for Women at the Borderlands

***From One Culture to Another***

**Joretta Joseph, Ed.D.**

Program Administrator and Graduate Advisor  
National Physical Science Consortium

***Getting There Cuando No Hay Camino  
(Getting There When There Is No Path):  
Chicanas in Mathematics, Science and Engineering***

**Norma Cantú, Ph.D.**

Professor, English and U.S. Latin@ Literatures  
University of Texas at San Antonio

**Moderator**

**Alex Ramirez, Ph.D. (CEOSE Member)**

Executive Director, Information Technology Initiatives  
Hispanic Association of Colleges and Universities (HACU)

**6:00-8:00 PM**

**Reception**

**The Front Page Arlington**

4201 Wilson Boulevard  
Arlington, VA 22203

**Joseph S. Francisco, Ph.D. (CEOSE Member)**

William E. Moore Distinguished Professor of Earth and  
Atmospheric Sciences and Chemistry  
Purdue University  
and President Elect  
American Chemical Society

**Janet Bryant, M.S., MBA**

Principal Scientist and Technology Deployment Manager,  
Pacific Northwest National Laboratory  
Department of Energy and Communications &  
Programming Subcommittee Chair  
Women Chemists Committee  
American Chemical Society

*The reception is sponsored by the  
American Chemical Society.*

## Wednesday, October 28, 2009

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**TIME**

**TOPIC**

**7:30 AM**

**Registration Opens**

**7:30-8:30 AM**

**Light Refreshments**

**MORNING SESSION**

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**8:30-10:00 AM**

**Introduction**

**Maria (Mia) Ong, Ph.D.**

**Cora B. Marrett, Ph.D.**

Deputy Director (Acting)  
National Science Foundation

### **Panel 3: Quantitative Research and Evaluation**

#### ***Learning from the Experiences of Women of Color in MentorNet's One-on-One Program***

**Carol Muller, Ph.D.**

President  
Blue Sky Consulting  
and Founder  
MentorNet

#### ***Science and Engineering Faculty, 2002-2007: Are the National Tactics Achieving the Goal?***

**Donna J. Nelson, Ph.D.**

Associate Professor, Chemistry  
University of Oklahoma

#### ***Professional Society Data***

**Rachel Ivie, Ph.D.**

Assistant Director, Statistical Research Center  
American Institute of Physics  
and

**Lisa Frehill, Ph.D.**

Executive Director  
Commission on Professionals in Science and Technology

#### **Moderator**

**Muriel Poston, Ph.D. (CEOSE Vice Chair)**

Dean of the Faculty  
and Professor, Biology  
Skidmore College

### **10:20 AM-12:00 PM Panel 4: Policy and Action**

#### ***AWIS' Science Career Network for Women of Color***

**Patrice O. Yarbough, Ph.D.**

Senior Scientist  
Division of Space Life Sciences  
Universities Space Research Association

#### ***Personal Latina Postdoctoral Experiences and Social Networking***

**Leticia Cano, Ph.D.**

Postdoctoral Fellow, Microbiology and Immunology  
University of Nevada

***New Paradigms for Sustainable Peer and  
Cross-Cultural Mentoring for Women Engineering  
Faculty of Color***

**Christine Grant, Ph.D.**

Associate Dean for Faculty Development,  
College of Engineering  
and Professor of Chemical and Biomolecular Engineering  
North Carolina State University

***That None Shall Perish: Collaborative Career  
Advancement Project for Women of Color***

**Claudia Rankins, Ph.D.**

Program Director, HBCU-UP, Education and  
Human Resources  
National Science Foundation

**Moderator**

**Kellina Craig-Henderson, Ph.D.**

Program Director, BCS, Social, Behavioral and  
Economic Sciences  
National Science Foundation  
and Affiliated Faculty Status  
Howard University

**12:00-1:15 PM**

**LUNCHEON**

**Keynote Address**

***Addressing STEM Education and  
Careers Through the White House Council  
on Women and Girls***

**Christina (Tina) M. Tchen, J.D.**

Director, Office of Public Engagement  
and Executive Director, Council on Women and Girls  
The White House

**Moderator**

**Cora B. Marrett, Ph.D.**

**1:30-1:40 PM**

**Evaluation Survey of the Mini-Symposium**



**1:40-3:00 PM**

**Summary Remarks & Roundtable Sessions**

Participant Comments and Suggestions to CEOSE

**Summary Remarks**

**Shirley M. Malcom, Ph.D.**

Head of the Directorate, Education and  
Human Resources Programs  
American Association for the Advancement of Science  
(AAAS)

**Introduction to Roundtable Sessions**

**Margaret E. M. Tolbert, Ph.D.**

**(CEOSE Executive Liaison)**

Senior Advisor, Office of Integrative Activities/Office  
of the Director  
National Science Foundation

**Moderator**

**Evelynn M. Hammonds, Ph.D.**

**3:00 PM**

**Closing Remarks**

**Theresa A. Maldonado, Ph.D.**

## Appendix B: Evaluation Report

The Mini-Symposium on Women of Color in STEM: Perspectives on Experiences, Research, Evaluation, and Policy in Higher Education and Careers  
October 27-28, 2009, Arlington, VA

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### EVALUATION REPORT

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**Judy Storeygard**

Project Evaluator, TERC

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#### Conference Goals:

The Mini-Symposium on Women of Color in STEM (Science, Technology, Engineering and Mathematics) was held on October 27-28, 2009 in Arlington, Virginia. The event was organized and implemented by TERC, a mathematics and science education research and development non-profit organization based in Cambridge, MA. The invitation to plan the Mini-Symposium came from the Committee on Equal Opportunities in Science and Engineering (CEOSE). CEOSE traditionally hosts mini-symposia targeting an underrepresented group or a group of minority-serving institutions to explore issues related to broadening participation. The lead organizer of the Mini-Symposium on Women of Color in STEM was Dr. Maria (Mia) Ong, a CEOSE member and Principal Investigator at TERC.

The charge for the Women of Color in STEM conference was framed as follows:

*Study and discuss challenges encountered by women and color with the objective of better understanding their situations and identifying solutions to their problems in accessing STEM education and employment opportunities, such that appropriate recommendations can be made to NSF. (Committee on Equal Opportunities in Science and Engineering 2007-08 Biennial Report to Congress, viii)*

Dr. Ong and TERC received primary funding for the Mini-Symposium through a National Science Foundation grant (# 0953861). Other co-sponsors were the American Chemical Society (ACS) and Dr. Phoebe Leboy on behalf of the Association for Women in Science. Dr. Evelyn Hammonds, CEOSE member and Harvard College Dean at Harvard University, served as the Mini-Symposium's Co-Chair. Dr. Margaret E. M. Tolbert, an NSF Senior Advisor and the Executive Liaison to CEOSE, served as the program officer for the event. Dr. Muriel Poston, CEOSE Vice Chair and Dean of Faculty of Skidmore College, and Dr. Patricia Campbell, President of Campbell-Kibler Associates, Inc., were advisors to the Organizing Committee. Ms. Lily Ko, Research and Administrative Assistant at TERC, served as the Assistant to the Organizing Committee.

The Organizing Committee described the purposes of the conference as follows:

For participants to:

1. Share their experiential knowledge and/or current evidence-based findings about women of color in STEM with CEOSE and the general STEM community; and
2. Provide comments and suggestions to CEOSE about how the recruitment, retention, and understanding about the experiences of women of color may be improved through research, practice, policy, and evaluation.

To fulfill these goals, the Organizing Committee planned four foci of discussion during the conference: Personal Perspectives, Qualitative Findings, Quantitative Research and Evaluation, and Policy and Action.

## Evaluation Plan

The evaluation questions were formulated to document the experiences of the participants during the conference as well as their plans for acting on the knowledge and understanding they gained from the conference:

1. How successful was the Mini-Symposium in communicating the experiences of and findings about women of color in STEM to participants?
2. How successful was the Mini-Symposium in generating interest among participants to follow up what they learned about the conference in their own work?
3. How successful was the Mini-Symposium in providing comments and suggestions to CEOSE that will improve research, practice, policy, and evaluation?

The findings are based on results from the Mini-Symposium Evaluation Survey (see attached) and interviews with conference staff. The survey was designed to capture quantitative data as well as participants' reflections about their experiences at the conference and about any post-conference plans that relate to conference experiences.

## Findings

Of the 114 attendees at the Mini-Symposium, 62 responded to the survey for a response rate of just over 54%. All participants were encouraged to fill out the survey, and time was allocated on the second day for this purpose. An online link to the survey was provided for participants who had not completed it in person.

### Description of Respondents

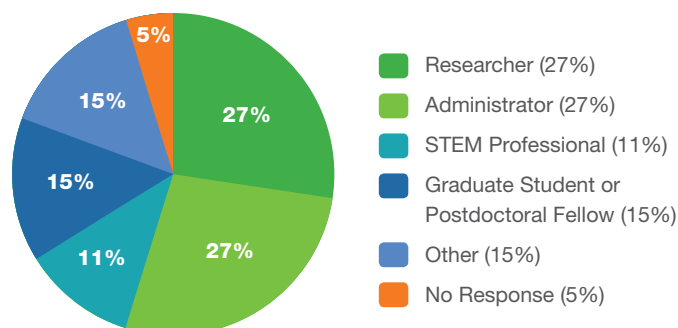
Slightly over 95% of the respondents were female. In terms of respondents' roles, the largest categories were researchers and administrators, with graduate students/post-doctoral fellows, and STEM professionals representing the other large categories. The charts below summarize the demographic data.

The majority of the respondents self-identified as either researchers (27%) or administrators (27%) [Figure 1]. Almost 45% of respondents came from a college or university, and about 21% work in a government agency [Figure 2].<sup>1</sup>

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**Figure 1: Participants' Position/Role**

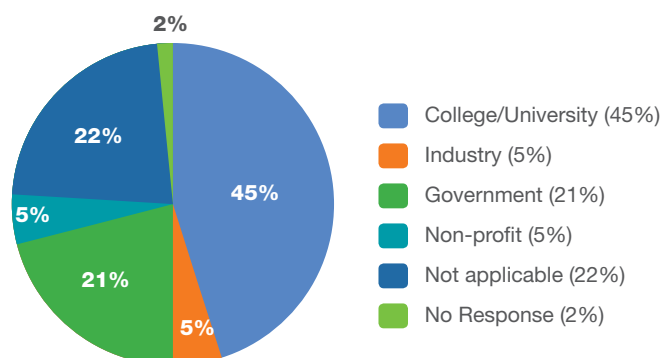
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**Figure 2: Participants' Sector**

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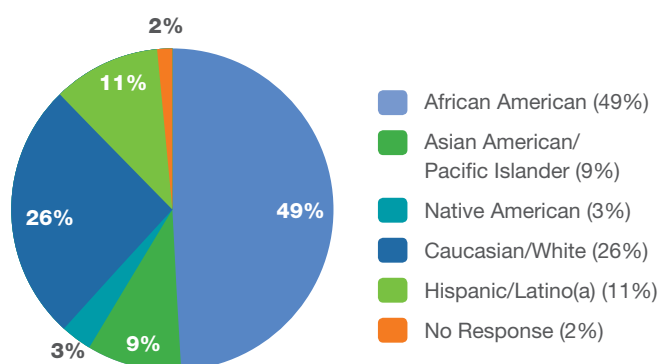


Slightly under half of the survey respondents identified themselves as African American (as compared to 36% from the registration data) with Hispanic/Latina, Caucasian/White, Asian American/Pacific Islander, and Native American as the other groups in attendance (some respondents selected more than one ethnicity/race) [Figure 3]. The % of the other groups from the survey data roughly corresponds to the demographics from the registration data.

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**Figure 3: Participants' Ethnicity/Race**

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<sup>1</sup> As compared to the registration data collected from the 114 conference participants, the survey participant sample had a somewhat lower % in the areas of government, non-profits, and industry, but all groups were represented in the survey responses.

## Ratings of Mini-Symposium as a Whole

*The conference was inspiring and energizing. Everything was incredibly organized and well thought out. There was a good balance between data and personal stories. Thank you!*

*Lack of encouragement equals discouragement.  
I can do more to encourage others, and I will.*

The above statements are typical of the enthusiasm generated by the conference. The data regarding the relevance of the conference as a whole were overwhelmingly positive. On all survey questions, data show that participants found the conference to be a valuable experience. Participants found the combination of data presentations and personal stories of the presenters to be meaningful. In their comments, participants pointed to the information they gained as well as the passion and inspiration engendered by the panel members. On the scale of 1-5, with 1 being Not at all Relevant, and 5 being Very Relevant, there were no ratings below 4 for the Overall Conference. The mean rating was 4.84.

Further, 95% of respondents said that they would be interested or very interested in attending another women of color in STEM conference. Participants' comments about the Mini-Symposium as a whole fell into the following categories (some comments may include more than one category):

### General Enthusiasm for the Conference

Over half of the participants wrote general comments that praised the conference. Participants found the Mini-Symposium to be informative and inspiring. For example,

*GREAT conference: Certainly should be run again!*

*5+++! Outstanding. I wish this ran every 2 years.*

*Amazing fabulous powerful informative gathering.*

*The conference was very well-planned, incredibly informative,  
and a great impetus for promoting change.*

About 25% of the comments specifically referred to the excellent organization of the conference. Participants used words and phrases such as: "well put together and beautifully run," "well-planned and orchestrated," "incredibly organized and well thought out." Conference organizers paid attention to the needs of individual participants, from planning a variety of menu options to accommodate special diets to putting supports in place for individuals with special needs (e.g., a participant, who was legally blind, receiving the biographies and abstracts in Braille, or two participants, who were hard of hearing, seated in front of a real-time transcription of the presentations).



## Other Themes

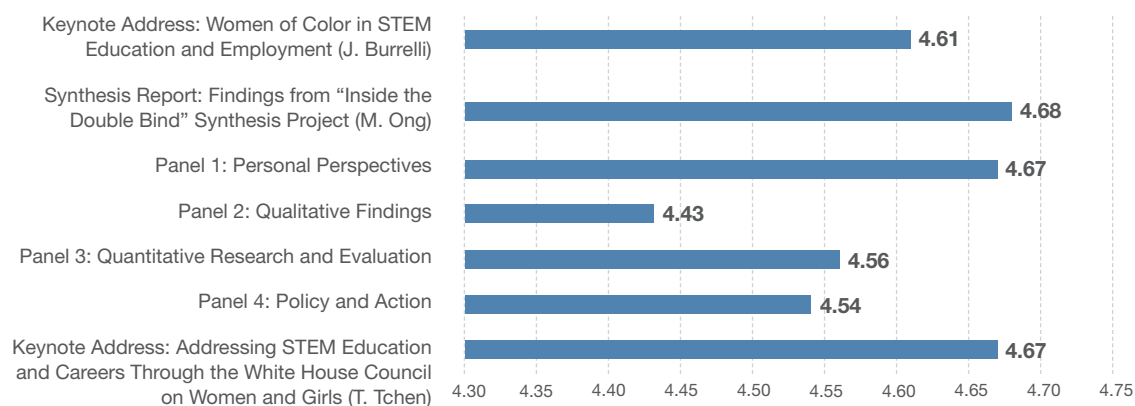
The rest of the comments were divided into several themes:

- ▶ **Networking:** Participants appreciated the opportunity to connect with fellow participants.  
*I learned, yet again, the people-to-people interactions are supereminently important.*
- ▶ **Importance of personal stories:** Participants wrote how they were inspired by the individual stories of the presenters.  
*Broadening participation is a complex issue, and it was helpful to hear individual stories of how WOC [women of color] have been influenced and supported along the way.*
- ▶ **Emphasis on data:** Some participants appreciated all of the data that the speakers put forth.  
*There was a great discussion about data collected by professional societies.*
- ▶ **Mentoring:** Depending on their roles, participants saw possibilities of how they can be mentors or how they could contact other women for support.  
*The conference will definitely impact how I interact with my high school students of color in the future.*  
*I learned that as Junior Faculty, there are others I can contact for advice, feedback, and assistance.*

## Ratings for Individual Sessions

Survey ratings for all of the sessions were uniformly high. As evidenced in the chart below, there was little variation in the means, and only one mean, for Panel 2: Qualitative Findings, was slightly below 4.5. Out of all the ratings, a “2” appeared only once. The ratings were mostly 5s with some 4s and a few 3s in the session ratings. These consistently high ratings reflect the enthusiastic comments that participants wrote about their positive experiences at the Mini-Symposium.

## Participants Ratings

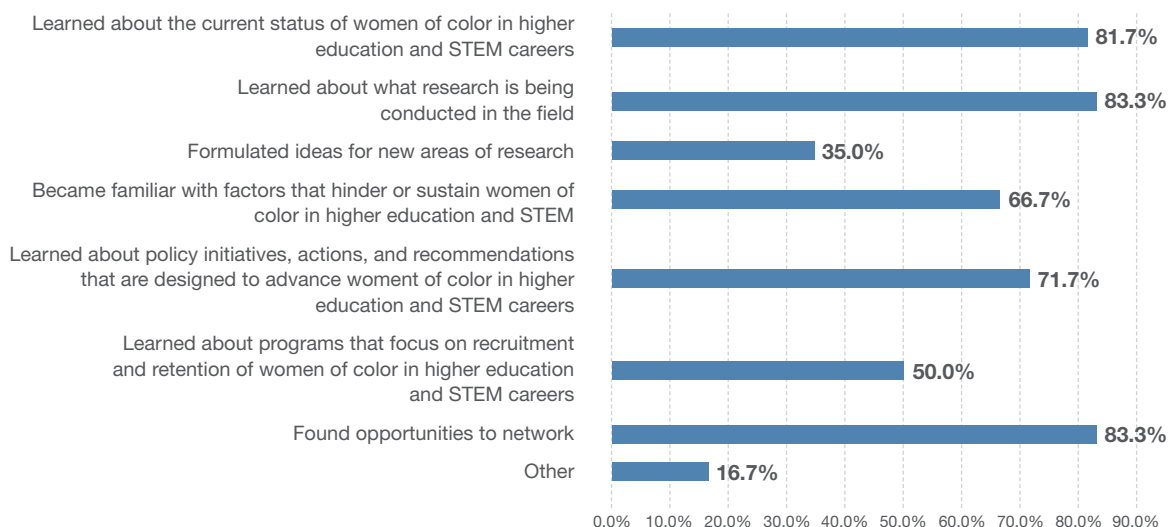


## Conference Outcomes

Data indicate that participants came away with information and enthusiasm that they intend to carry forward in their work.

When asked on the survey about a series of outcomes, participants responded in the following way: Over 80% of respondents replied that they “Learned about the current status of women of color in higher education and STEM careers,” “Learned about what research is being conducted in the field,” and “Found opportunities to network”. The only choice that fell below 50% was, “Formulated ideas for new areas of research,” possibly because fewer than 50% identified themselves as researchers or graduate students.

### Outcomes of the Conference for Participants



When asked “When you return to work, what are two findings, issues, or questions you will discuss with your colleagues that emerged from the conference?,” participants were able to write about a range of specific issues and questions they want to pursue and findings from the conference that they found to be informative.

In terms of what they intend to bring back to their institutions, the following emerged as themes from the 55 participants who responded to this survey item.

### Awareness of Data and Resources

About half of the comments referred to the importance of knowing the current status, and to general information about and available resources for women of color (WOC) in STEM. A few wrote that they learned about resources such as CEOSE, and opportunities, such as ADVANCE (an NSF program that promotes female faculty). Several participants noted that they were surprised by the data showing the underrepresentation of Asian women at the top faculty level. The data presented by Donna Nelson about underrepresented groups among tenured and tenure-track

science and engineering faculty, and by Maria Ong about the findings from her *Inside the Double Bind* synthesis project, were also commented on by several participants. Others mentioned learning about the “imposter syndrome” and coping strategies such as “sticking together” and “blending in.” Being exposed to the interpretation of national statistics was another powerful part of the conference for some of the participants.

### Dissemination and Communication

Building on what they learned, one-third of the participants wrote about their plans for communicating the information they learned, and the importance they place on dissemination of the information presented at the conference. Some wrote about the importance of wide dissemination through publication of the data and stories presented at the conference. Others wrote about communicating what they learned to their own institutions:

*I will reach out to academics about the need to incorporate industry and translational medicine perspectives in STEM.*

*I'm going to be more vocal about the numbers of URM [underrepresented minority] faculty (& women). I knew the general numbers, but now have some resources as references.*

*I'm going to educate my chair about “horror” stories.*

*I am going to plan a lecture series for minority faculty.*

*I will highlight the lack of Asian-American women in STEM as faculty. This was the most surprising finding.*

*I will try to get data from my institution, and coordinate a forum to open a thorough discussion according to the findings.*

### Mentoring and Networking

About 20% of the respondents wrote about the importance of networking and mentoring, and some of the strategies that they plan to enact. For example:

*I'm very interested in forming study groups for WOC in general chemistry.*

*Let's provide more mentoring for undergrads and grads [to encourage them to enter information technology (IT)].*

*Turn the “graduates” of the ACS scholars + SEED programs into a COMMUNITY that will mentor new participants.*

*I will encourage people to sign up for mentor.net. It seems easy + productive.*

### Recruitment and Retention

Approximately 15% of the respondents wrote about the pressing issues of recruitment and retention that they either learned about at the conference and/or intend to take actions to address. Topics that participants want to address with their colleagues include:

- ▶ Continuing need for effective strategies that bolster the ranks of women of color in STEM.
- ▶ Purposefully sending faculty to the top-producing institutions of URMs.
- ▶ Tailoring recruitment efforts to attract young women to chemistry and physics.
- ▶ Better assessing the individual needs of STEM WOC within existing STEM development programs.
- ▶ Isolation of WOC.
- ▶ Post-doc issues and how they impact transition to faculty for women of color.

### Articulation and Transitions within the K-16 Educational System

About 10% of the respondents wrote about the priority for increasing the numbers of WOC in STEM at all levels of education. Since the data show that transitions from one level to another can be a barrier to WOC, articulation agreements across all levels are critical.

*I want to investigate opportunities to create and fund special programs/experiences for those who are affiliated with K-12 science teaching and learning.*

*[It is important to have] articulation between community colleges and universities, create new model ideas, so that students in STEM could receive dual credits.*

*I will continue to pursue how to more effectively bring about STEM transfer from community colleges to four-year institutions.*

### Questions to Pursue

The questions participants posed in their comments centered on representation and recruitment and strategies to address the inequities.

*Why aren't women of color represented at higher percentages in our field?*

*How do we improve the role of the organization in shaping the professional careers of STEM WOC?*

*How do we better assess the individual needs of STEM WOC within existing STEM development programs?*

*What is happening here [at the respondent's institution] with diversity?*

*What is done toward minority recruitment?*

*Where are the women in IT?*

*How can I help my organization collect more useful data?*

### Suggestions to Increase Usefulness of the Mini-Symposium

Only 29 participants responded to this question. Given the other data, the lower response rate for this question most likely indicates participants' satisfaction with the conference. Suggestions also appeared in the "other comments" section.

The most common suggestion, about 25%, was to allow for more time for discussion and networking. For example,

*The only thing I could suggest for another time is to provide some additional times for focused networking (informal) around introductions and specific questions. The dialogue we had at our table after the very last speaker was rich, and we all wished it could have begun earlier.*

*We just needed more time for presentations and discussion. It seems to me that a biennial conference would allow for research initiatives to be driven forward & generate results.*

Some participants had suggestions for topics to be included at future conferences:

- ▶ WOC in industry, at the B.S., M.S., and Ph.D. levels.
- ▶ Panel of representatives from minority-serving institutions.
- ▶ Diversity within women of color (e.g. within Hispanic women, U.S. born v. non-U.S. born.
- ▶ Contrast experiences of WOC with white women.
- ▶ Concluding session on 'Where do we go from here?'
- ▶ Active mentoring of K-12 girls of color (GOC) in STEM.
- ▶ Transition of WOC from universities to STEM industries.
- ▶ NSF panel: What types of research are they looking for in diversifying STEM participation? What research can best inform federal policy initiatives?
- ▶ Explicit opportunities for mentoring, particularly for mid-career professionals.
- ▶ Explicit opportunities to connect with potential employers.
- ▶ Structural barriers for WOC in STEM.

Other participants suggested increasing the size of the conference, and some mentioned including more of certain populations, e.g., Asian women, gay women, Hispanic women.

There were a few suggestions regarding logistics, e.g., to make links to studies and research reports available, to make handouts accessible on-line in order to use less paper, to make materials available prior to the conference, and to hold the conference closer to the weekend.



## Suggestions for CEOSE

To fulfill their charge, the Organizing Committee members planned a final session for the purpose of providing suggestions to CEOSE. The session began with an introduction by the CEOSE Executive Liaison, Dr. Margaret E. M. Tolbert, who shared that one of the purposes of the Mini-Symposium was to provide CEOSE and others with “comments and suggestions about how the recruitment, retention, and understanding about the experiences of women of color may be improved through research, practice, policy, and evaluation” (Tolbert (2009), *Women of Color in STEM*, PowerPoint presentation, CEOSE Mini-Symposium on Women of Color in STEM: Perspectives on Experiences, Research, Evaluation, and Policy in Higher Education and Careers., October 28, 2009, Arlington, VA). Participants understood that the document that will be developed from their suggestions will be prepared by TERC and submitted to the CEOSE Chair and Executive Liaison, CEOSE members, co-sponsors of the Mini-Symposium, and the STEM community.

Individuals and small groups submitted suggestions based on their conversations during the session. Suggestions were wide-ranging. One emphasis was strengthening the “Broader Impacts” merit criterion of NSF proposals, and a related focus was how to determine, recognize, and promote results that broaden participation of WOC in STEM. Other topics addressed in the suggestions were collecting and disseminating data to document the status and progress of WOC in STEM, developing mentoring programs for women at all levels of education, and including WOC in STEM industry careers in the discussions.

## Summary

*It takes years before you can see the results of such committee actions.  
But one has to stay the course and keep contributing to expand participation  
of underrepresented groups in STEM.*

Referring to CEOSE, this participant also captured the commitment to educating, recruiting, and retaining women of color in STEM careers that was evident at the Mini-Symposium on Women of Color in STEM. Data indicate that participants deeply appreciated the opportunity to come together to be exposed to the current data about WOC in STEM and the available resources and initiatives as well as to be inspired by the personal stories of WOC in STEM careers. They valued the time to network with others who have common interests. Participants also were pleased with the seamless organization of the conference, the attention to timing, variety of sessions and speakers, and attention to individual needs.

Finally, as stated above, over 95% indicated that they would be interested or very interested in attending a future conference. According to the data, they left the conference motivated to pose questions, engage in conversations, and take actions at their own institutions.

## 1. Mini-Symposium Evaluation Survey

### 1. Please check your primary position or role:

- ☐ Researcher
- ☐ Administrator
- ☐ STEM Professional
- ☐ Graduate Student or Postdoctoral Fellow
- ☐ Other
- ☐ No response

If Other (please specify)

### 2. If you are a researcher, administrator or STEM professional, please indicate which sector you're from:

- ☐ University
- ☐ Industry
- ☐ Government
- ☐ Non-profit
- ☐ Not applicable

### 3. Please check your primary role at the mini-symposium:

- ☐ Attendee
- ☐ Speaker
- ☐ Other

If other (please specify):

### 4. Please check your gender:

- ☐ Male
- ☐ Female
- ☐ No Response

**5. Please check your race/ethnicity (check all that apply):**

- ☐ African American
- ☐ Asian American/Pacific Islander
- ☐ Native American
- ☐ Caucasian/White
- ☐ Hispanic/Latina
- ☐ No Response

**6. Overall and Session Ratings: Relevance of content to your work. Ratings:  
1 = Not at all relevant, 2 = Slightly relevant, 3 = Somewhat relevant, 4 =  
Relevant, 5 = Very relevant, N/A = Did not attend session**

Overall conference	<input type="text"/>
Keynote Address: Women of Color in STEM Education and Employment (J. Burrelli)	<input type="text"/>
Session Findings from Inside the Double Bind Synthesis Project (M. Ong)	<input type="text"/>
Panel 1: Personal Perspectives	<input type="text"/>
Panel 2: Qualitative Findings	<input type="text"/>
Panel 3: Quantitative Research and Evaluation	<input type="text"/>
Panel 4: Policy and Action	<input type="text"/>
Keynote Address: (T. Tchen)	<input type="text"/>

**7. Overall and Session Comments:**

Overall conference	<input type="text"/>
Keynote Address: Women of Color in STEM Education and Employment (J. Burrelli)	<input type="text"/>
Session Findings from Inside the Double Bind Synthesis Project (M. Ong)	<input type="text"/>
Panel 1: Personal Perspectives	<input type="text"/>
Panel 2: Qualitative Findings	<input type="text"/>
Panel 3: Quantitative Research and Evaluation	<input type="text"/>
Panel 4: Policy and Action	<input type="text"/>
Keynote Address: (T. Tchen)	<input type="text"/>

**8. What were outcomes of this conference for you? (check all that apply)**

- ☐ Learned about the current status of women of color in higher education and STEM careers
- ☐ Learned about what research is being conducted in the field
- ☐ Formulated ideas for new areas of research
- ☐ Became familiar with factors that hinder or sustain women of color in higher education and STEM careers
- ☐ Learned about policy initiatives, actions, and recommendations that are designed to advance women of color in higher education and STEM careers
- ☐ Learned about programs that focus on recruitment and retention of women of color in higher education and STEM careers
- ☐ Found opportunities to network
- ☐ Other

If other (please specify):

**9. When you return to work, what are two findings, issues or questions you will discuss with your colleagues that emerged from the conference?**

**10. Please list any programmatic changes that would have made the conference more useful for you.**

**11. How interested would you be in attending another Women of Color in STEM conference?**

- ☐ Not at all interested
- ☐ Slightly interested
- ☐ Somewhat interested
- ☐ Interested
- ☐ Very interested

**12. Other comments:**

## Appendix C: Funder and Co-Sponsors

The Mini-Symposium on Women of Color in Science, Technology, Engineering, and Mathematics (STEM) was funded by the National Science Foundation through Grant number 0953861. The co-sponsors were TERC, the American Chemical Society (ACS), and Dr. Phoebe Leboy on behalf of the Association for Women in Science (AWIS).



### Funder: National Science Foundation

The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 “to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense...” NSF is the funding source for approximately 20 percent of all federally supported basic research conducted by America’s colleges and universities. In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing. We fulfill our mission chiefly by issuing limited-term grants—currently about 10,000 new awards per year, with an average duration of three years—to fund specific research proposals that have been judged the most promising by a rigorous and objective merit-review system. Most of these awards go to individuals or small groups of investigators. Others provide funding for research centers, instruments and facilities that allow scientists, engineers and students to work at the outermost frontiers of knowledge.

NSF’s goals—discovery, learning, research infrastructure and stewardship—provide an integrated strategy to advance the frontiers of knowledge, cultivate a world-class, broadly inclusive science and engineering workforce and expand the scientific literacy of all citizens, build the nation’s research capability through investments in advanced instrumentation and facilities, and support excellence in science and engineering research and education through a capable and responsive organization. We like to say that NSF is “where discoveries begin.” For additional information on NSF, see its website at [www.nsf.gov](http://www.nsf.gov).



## Co-Sponsor: TERC

For more than forty years, TERC has been introducing millions of students throughout the United States to the exciting and rewarding worlds of math and science learning. Led by a group of experienced, forward-thinking math and science professionals, TERC is an independent, research-based organization dedicated to engaging and inspiring all students through stimulating curricula and programs designed to develop the knowledge and skills they need to ask questions, solve problems, and expand their opportunities. TERC's mission is to improve mathematics and science education. TERC works at the frontiers of theory and practice to contribute to a deeper understanding of learning and teaching; enhance instruction through professional development; develop applications of new technologies to education; create curricula and other products; and support reform in both school and informal settings.

TERC imagines a future in which learners from diverse communities engage in creative, rigorous, and reflective inquiry as an integral part of their lives—a future where teachers and students alike are members of vibrant communities where questioning, problem solving, and experimentation are commonplace. This vision is grounded in the belief that science and math literacies are critical to strengthening and preserving a democratic society. For additional information on TERC, see [www.terc.edu](http://www.terc.edu).



## Co-Sponsor: American Chemical Society

With more than 154,000 members, the American Chemical Society (ACS) is the world's largest scientific society and one of the world's leading sources of authoritative scientific information. A nonprofit organization founded in 1876, chartered by Congress, ACS is at the forefront of the evolving worldwide chemical enterprise and the premier professional home for chemists, chemical engineers and related professions around the globe.

We are dynamic and visionary, committed to improving people's lives through the transforming power of chemistry. This vision fully complements the ACS Mission—to advance the broader chemistry enterprise and its practitioners for the benefit of Earth and its people. Together, these two statements represent our ultimate reason for being and provide a strategic framework for our efforts.

The Society publishes numerous scientific journals and databases, convenes major research conferences and provides educational, science policy and career programs in chemistry. We also give more than \$22 million every year in grants for basic research in petroleum and related fields. We also play a leadership role in educating and communicating with public policy makers and the general public about the importance of chemistry in our lives. This includes identifying new solutions, improving public health, protecting the environment and contributing to the economy. For additional information on ACS, see [www.acs.org](http://www.acs.org).





### **Co-Sponsor: Dr. Phoebe Leboy on behalf of the Association for Women in Science (AWIS)**

The Association for Women in Science (AWIS) is the premiere leadership organization advocating the interests of women in science and technology. For nearly 40 years, AWIS has fought for equity and career advancement for women from the bench to the board room. As a nonprofit, AWIS is open to all women and men who support our mission of working to ensure that women in science, technology, engineering and mathematics can achieve their full potential. To join, visit the AWIS website at <http://www.awis.org>.

## Appendix D: Speaker Biographies (in alphabetical order)

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### **Sandra Begay-Campbell, M.S.**

Principal Member of Technical Staff, Sandia Laboratory; CEOSE Member

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Sandra Begay-Campbell, M.S., is a Principal Member of the Technical Staff at Sandia National Laboratories and is a former Regent (Trustee) for the University of New Mexico. Ms. Begay-Campbell leads Sandia's technical efforts in the Renewable Energy Program to assist tribes with renewable energy development. She received a Bachelor of Science - Civil Engineering degree from the University of New Mexico. She worked at Lawrence Livermore National Laboratories before she earned a Master of Science - Structural Engineering degree from Stanford University and she also worked at Los Alamos National Laboratory. Ms. Begay-Campbell is a recipient of the University of New Mexico's 2007 Zia Alumnus Award, the 2005 UNM School of Engineering Distinguished Alumnus Award and she received the Stanford University 2000 Multicultural Alumni of the Year Award. She was also selected as a recipient of the Governor's Award for Outstanding Women from the New Mexico Commission on the Status of Women. She is recognized in a new book profiling women engineers, *Changing Our World: True Stories of Women Engineers*. Ms. Begay-Campbell is included in the chapter "Women in Power," which describes her effort to provide electricity through solar panels and other alternative energy solutions to hundreds of remote tribal members on the Navajo Reservation.

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### **Joan S. Burrelli, Ph.D.**

Senior Analyst, Division of Science Resources Statistics,  
National Science Foundation

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Joan S. Burrelli, Ph.D., is a Senior Analyst in the Science and Engineering Indicators Program of the Division of Science Resources Statistics at the National Science Foundation. She is responsible for the Higher Education Chapter of Science and Engineering Indicators and the congressionally-mandated report, *Women, Minorities, and Persons with Disabilities in Science and Engineering*. She received her Ph.D. in Sociology from the University of Maryland in 1980, specializing in the Sociology of Occupations and Professions. Before coming to NSF, she directed surveys of education and employment of chemists at the American Chemical Society.

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**Leticia Cano, Ph.D.**

Postdoctoral Fellow, Microbiology and Immunology, University of Nevada

Leticia Cano, Ph.D., is a Postdoctoral Fellow in the Department of Microbiology and Immunology at the School of Medicine, University of Nevada, Reno. In the laboratory of Dr. Dorothy Hudig, she is analyzing the relationship between natural killer lymphocyte granule proteins and autoimmune disease. As a Postdoctoral Fellow, Dr. Cano identified candidate biomarkers for 3 autoimmune diseases in the laboratory of Dr. Henry Fales at the National Heart, Lung and Blood Institute of the National Institutes of Health. She identified an autoantigen in rheumatoid arthritis as her Ph.D. thesis research at the City of Hope Graduate School. Prior to this, she was a MALDI-TOF MS Applications Scientist at Bruker Daltonics where she acquired her mass spectrometry expertise. Dr. Cano is a member of the Association of Women in Science (AWIS) Diversity Task Force, Society for the Advancement of Chicano and Native American Scientists (SACNAS) and League of United Latin American Citizens (LULAC). She began networking with Latina AWIS members through LinkedIn and started a Latina Scientist group.

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**Norma Cantú, Ph.D.**

Professor, English and U.S. Latin@ Literatures, University of Texas at San Antonio

Norma E. Cantú, Ph.D., serves as a Professor of English at the University of Texas at San Antonio. For over 30 years, she has been an advocate of increasing the number of Chicanas in higher education and in graduate programs. She is editor or co-editor of a number of books (*Telling to Live: Latina Feminist Testimonios* (2000), *Chicana Traditions: Continuity and Change* (2001), *Flor y Ciencia: Chicanas in Mathematics, Science and Engineering* (2006), *Paths to Discovery: Autobiographies of Chicanas with Careers in Mathematics, Science and Engineering* (2008), *Dancing across Borders: Danzas y Bailes Mexicanos* (2009)) and author of the award-winning *Canícula: Snapshots of a Girlhood en la Frontera* (1995). Professor Cantú, a folklorist, literary critic and writer, is an internationally-known scholar of the U.S.-Mexico borderlands.

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**Kellina Craig-Henderson, Ph.D.**

Program Director, Social Psychology, National Science Foundation; Department of Psychology, Howard University

Kellina M. Craig-Henderson, Ph.D., is a Program Director at the National Science Foundation in the Social Psychology Program within the Behavioral & Cognitive Sciences Division of the Social, Behavioral and Economic Sciences Directorate. She retains an affiliation with the Department of Psychology at Howard University, where she was promoted to the rank of Full Professor shortly before officially joining the federal service to work with at NSF. Dr. Craig-Henderson, who also serves as the Foundation's Human Subjects Research Protections Officer, has published numerous reports of empirical research as well as a book on interracial relationships. Her research includes studies of groups, cross-cultural gender and race stereotyping,

and aggression. The National Science Foundation, the Ford Foundation and the American Psychological Association have provided support for her work. She has presented findings from her research activities at a variety of regional, national and international research and pedagogical meetings.

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**Audrey Ellerbee, Ph.D.**

Postdoctoral Fellow, Chemistry and Chemical Biology, Harvard University

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Audrey Ellerbee, Ph.D., is a Postdoctoral Fellow in the laboratory of Professor George Whitesides, Department of Chemistry and Chemical Biology, Harvard University. Dr. Ellerbee holds a B.S.E. in Electrical Engineering from Princeton University and a Ph.D. in Biomedical Engineering from Duke University. Prior to arriving at Duke, she taught for one year in the Department of Infocommunications Technology at Ngee Ann Polytechnic in Singapore. At Duke, Dr. Ellerbee served as President of the Graduate and Professional Student Council, and was a concurrent member of the Board of Directors of the Duke Alumni Association, the President's Council on Black Affairs, and the Board of Trustees' Committee on Institutional Advancement, among a host of other committee appointments, community service, and leadership roles during her graduate tenure. Dr. Ellerbee spent a year on Capitol Hill as a Legislative Assistant to the Honorable Carl Levin, United States Senator, in her capacity as the Arthur H. Guenther Congressional Fellow. A past recipient of the National Science Foundation Graduate Research Fellowship, the Graduate Student of the Year Award from the National Society of Black Engineers, and the Ford Foundation Diversity Postdoctoral Fellowship, Dr. Ellerbee is currently a member of the Board of Directors of the National Postdoctoral Association, and serves on the Advisory Board of the Keller Center for Innovation in Engineering Education at Princeton University. Following her postdoctoral fellowship, she will begin a tenure-track position in the Department of Electrical Engineering at Stanford University.

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**Lisa Frehill, Ph.D.**

Executive Director, Commission on Professionals in Science and Technology

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Lisa Frehill, Ph.D., is Executive Director of the Commission on Professionals in Science and Technology. She was the PI for New Mexico State University's ADVANCE: IT Award. Current projects focus on: engineering workforce; gender and ethnic issues in access to STEM careers; and women's international participation and collaboration in STEM.

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**Christine Grant, Ph.D.**

Associate Dean of Faculty Development, College of Engineering; Professor of Chemical and Biomolecular Engineering, North Carolina State University

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Christine S. Grant, Ph.D., was the first African American woman faculty member in the College of Engineering and in the Department of Chemical Engineering at NC State. Since her arrival in 1989, she has garnered numerous top honors: the



Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM), the National Technical Association's Top Women in Science and Engineering Award, Outstanding Young Engineering Alumni of Georgia Tech, Exxon Engineering Foundation Research Award, 3M Company Young Faculty Award, Dow Chemical Company Young Faculty Award, Distinguished Service Award by the American Institute of Chemical Engineers, and many more. In June 2002, she celebrated the grand opening of her new research laboratory. Dr. Grant has served as a research mentor to students in NASA's Undergraduate Researchers program and NSF's Research Experience for Undergraduates program. She has given numerous invited lectures across the globe, inspiring students on professional development and the merits of attending graduate school. She serves as mentor to engineering students at the University of Science and Technology in Ghana, West Africa, where they named a library in her honor. Dr. Grant earned her B.S. (Sc.B.) in Chemical Engineering from Brown University. She went on to earn her M.S. and Ph.D. in Chemical Engineering from the Georgia Institute of Technology.

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**Evelynn M. Hammonds, Ph.D.**

Dean of Harvard College and Professor of the History of Science and African American Studies, Harvard University; CEOSE Member

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Evelynn M. Hammonds, Ph.D., currently serves as Dean of Harvard College. Prior to her appointment as dean, she served as Harvard University's first Senior Vice Provost for Faculty Development and Diversity. She is also the Barbara Gutman Rosenkrantz Professor of History of Science and of African and African American Studies. Dean Hammonds joined Harvard after teaching at the Massachusetts Institute of Technology (MIT), where she was also the Founding Director of the Center for the Study of Diversity in Science, Technology and Medicine. She is the author and co-editor of several books and many scholarly articles. Dean Hammonds grew up in the wake of segregation and was forced to deal with racism growing up. Hammonds has earned a Bachelor of Science in Physics from Spelman College, a Bachelor of Electrical Engineering from Georgia Institute of Technology, a Master's degree in Physics from MIT, and a Ph.D. in the History of Science from Harvard. Dean Hammonds was a Postdoctoral Fellow in the School of Social Science at the Institute for Advanced Study in Princeton, NJ, and also served as a Sigma Xi Distinguished Lecturer from 2003 to 2005. Currently she is an associate member of the Broad Institute of Harvard and MIT while also serving on a number of boards including the Social Science Research Council, the Board of Overseers of the Museum of Science in Boston, and the Association of American Colleges and Universities. She holds an honorary doctorate of humane letters from Spelman College. She was named a Fellow of the Association for Women in Science (AWIS) and named to the National Science Foundation's Committee on Equal Opportunities in Science and Engineering.

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**Rachel Ivie, Ph.D.**

Assistant Director, Statistical Research Center, American Institute of Physics

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Rachel Ivie, Ph.D., is the Assistant Director of the Statistical Research Center at the American Institute of Physics. She received her Ph.D. in Sociology from the University of North Carolina, Chapel Hill, where she specialized in the sociology of gender. She is co-author of the reports, *Women in Physics and Astronomy, 2005* and *Untapped Talent: The African American Presence in Physics and the Geosciences*. In addition to working on surveys for AIP's Member Societies and other scientific organizations, Dr. Ivie collects data on physics faculty and the academic job market.

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**Ivy Krystal Jones, M.S.**

Doctoral Student, Physics, Hampton University

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Ivy Krystal Jones, M.S., earned her B.S. in Chemistry and B.A. in Psychology with honors from Tuskegee University. She earned an M.S. in Physics with a concentration in Optics, specializing in solid-state laser material development, from Hampton University. She also earned an M.S. in Mechanical Engineering, involving the fabrication, morphological characterization, and evaluation of space survivable nanocomposite material. Currently, Ms. Jones is pursuing a Ph.D. in Physics with a focus in laser material research and development at Hampton University.

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**Joretta Joseph, Ed.D.**

Program Administrator and Graduate Advisor, National Physical Science Consortium

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Joretta Joseph, Ed.D., has a diverse academic background with a Bachelor's degree in Accounting from Clark Atlanta University, a Master's degree in Business Administration from Howard University, and most recently, a Doctorate of Education degree (Education Leadership–Higher Education) from the University of Southern California (USC). Currently, Dr. Joseph works as the Program Administrator and Graduate Advisor at the National Physical Science Consortium, which is a national, educational, nonprofit organization that administers fellowships for individuals, particularly women and people of color, seeking doctorate degrees in the physical sciences. In addition to that she is an Adjunct Professor at Pasadena City College, teaching Accounting, and she works with the Upward Bound Program at USC, preparing high school students for college.

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**Marigold Linton, Ph.D.**

Director, American Indian Outreach, University of Kansas; CEOSE Member

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Marigold Linton, Ph.D., is Cahuilla-Cupeno, and an enrolled member of the Morongo Band of Mission Indians. She was born and raised on the Morongo Reservation in Southern California and is the first California reservation Indian to have ever left the reservation to go to a university. She received her B.A. from the University of

California, Riverside; did graduate work at the University of Iowa; and received her Ph.D. from University of California, Los Angeles. All degrees were in Experimental Psychology. She spent her sabbatical/postdoctoral year with Donald E. Norman, Ph.D., at University of California, San Diego. She taught at San Diego State University and the University of Utah, and spent 12 years an Administrator at Arizona State University. During that time she served most importantly as Director of American Indian Programs serving Arizona tribes through the Rural Systemic Initiative. She then moved to the University of Kansas as Director of American Indian Outreach, where she is ending her 11th year. Dr. Linton developed a consortium with Haskell Indian Nations University to support biomedical research opportunities for American Indian students and faculty at both institutions. She is a founder of both SACNAS and the National Indian Education Association, and has served on the SACNAS Board of Directors. She has had a number of significant national appointments including: Committee on Equal Opportunities in Science and Engineering (CEOSE); NIH National Institutes of General Medical Science, National Advisory Research Resources Council; Carnegie Foundation for the Advancement of Teaching, Board of Directors; National Research Council, Committee on Assessment for NIH Minority Research/Training Programs, III; and the National Academy of Sciences, Fellowship Office Advisory Committee. Awards and honors include the Marigold Linton Endowed Scholarships for American Indian Students at the University of Kansas, one of 37 biographies of notable Americans in *Dream It, Do It* by S. Cook & G. Sholander (2004); Pride of American Indians; and University California, Riverside 40th Anniversary: "One of 40 Alumni Who Make a Difference" (1994). She co-authored a best selling statistics book, *The Practical Statistician*.

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#### **Shirley M. Malcom, Ph.D.**

Director, Education and Human Resources Program, American Association for the Advancement of Science (AAAS)

Shirley M. Malcom, Ph.D., is Head of the Directorate for Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. Dr. Malcom serves on several boards—including the Heinz Endowments and the H. John Heinz III Center for Science, Economics and the Environment—and is an Honorary Trustee of the American Museum of Natural History. In 2006, she was named as Co-Chair (with Leon Lederman) of the National Science Board Commission on 21st Century Education in STEM. She serves as a Regent of Morgan State University and as a Trustee of Caltech. In addition, she has chaired a number of national committees addressing education reform and access to scientific and technical education, careers and literacy. Dr. Malcom is a former Trustee of the Carnegie Corporation of New York. She is a Fellow of the AAAS and the American Academy of Arts and Sciences. She served on the National Science Board, the policy-making body of the National Science Foundation, from 1994 to 1998, and served on the President's Committee of Advisors on Science and Technology, from

1994-2001. Dr. Malcom received her Doctorate in Ecology from Pennsylvania State University; Master's degree in Zoology from the University of California, Los Angeles; and Bachelor's degree with Distinction in Zoology from the University of Washington. She also holds 15 honorary degrees. In 2003, Dr. Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy.

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**Theresa A. Maldonado, Ph.D.**

Deputy Director, Texas Engineering Experiment Station, Texas A&M University System; Associate Dean for Research, Dwight Look College of Engineering; Professor of Electrical & Computer Engineering, Texas A&M University; CEOSE Chair

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Theresa A. Maldonado, Ph.D., P.E. is Associate Dean of Engineering for Research, Texas A&M University, and Deputy Director of the Texas Engineering Experiment Station. In addition to serving as the Chief Administrator for engineering research and extension activities, Dr. Maldonado is also Professor of Electrical and Computer Engineering. Prior to joining Texas A&M in 2003, Dr. Maldonado served as Associate Vice President for Research at The University of Texas at Arlington (UTA). Previously, she was Associate Dean for Research and Professor of Electrical Engineering at UTA. From 1981 to 1986, she was a Member of Technical Staff at AT&T Bell Laboratories. She took a detour in 1999 and served as an Engineering Research Centers Program Director in the Engineering Directorate at the National Science Foundation, where she was recognized with the Director's Award for Program Management Excellence and the Director's Award for Collaborative Integration for her services on the CAREER Coordinating Committee. She also received a Certificate of Appreciation for Distinguished Service in the development of the NSF ADVANCE Program. Dr. Maldonado earned the Ph.D., M.S.E.E., and B.E.E. with Highest Honors degrees in Electrical Engineering from the Georgia Institute of Technology. Dr. Maldonado is the recipient of numerous awards, including the National Science Foundation Presidential Young Investigator Award. She was an invited participant at the National Academy of Engineering (NAE) Frontiers of Engineering and the German-American Frontiers of Engineering meetings. She was appointed to the NAE Committee on Diversity of the Engineering Workforce, NSF Committee on Equal Opportunities in Science and Engineering, and the NSF Committees of Visitors for the ERC Program and for the Math and Physical Sciences Directorate. She was inducted into the Inaugural Council of Outstanding Young Engineering Alumni at Georgia Tech in 1995. Dr. Maldonado serves on several national and state boards. She is a senior member of the IEEE and member of the Optical Society of America, SPIE, Eta Kappa Nu, Tau Beta Pi, and Sigma Xi.

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**Cora B. Marrett, Ph.D.**

Acting Deputy Director, National Science Foundation

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Dr. Cora B. Marrett was appointed Acting Deputy Director of the National Science Foundation, effective January 18, 2009. She had been the Assistant Director for Education and Human Resources (EHR), a position she held from February 2007, until becoming Acting Deputy Director. She led NSF's mission to achieve excellence in U.S. science, technology, engineering and mathematics (STEM) education at all levels and in both formal and informal settings. Earlier, from 1992-1996, Dr. Marrett was NSF's Assistant Director for Social, Behavioral and Economic Sciences (SBE). Prior to returning to NSF in 2007, Dr. Marrett served as the University of Wisconsin's Senior Vice President for Academic Affairs for six years. Before that, she served as Senior Vice Chancellor for Academic Affairs and Provost at the University of Massachusetts-Amherst for four years. Dr. Marrett holds a B.A. degree from Virginia Union University, and M.A. and Ph.D. degrees from UW-Madison, all in Sociology. She received an honorary doctorate from Wake Forest University in 1996, and was elected a Fellow of the American Academy of Arts and Sciences in 1998 and the American Association for the Advancement of Science in 1996.

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**Carol Muller, Ph.D.**

President, Blue Sky Consulting

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Carol B. Muller, Ph.D., is an educator and social entrepreneur. She is the founder of MentorNet and served as its chief executive. Dr. Muller has spent more than 30 years working in higher education in areas of academic administration, faculty recruitment and development, strategic planning and budget development, external relations, corporate and foundation relations, admissions, student development, educational program development, and facilities program planning. Currently, she is writing, speaking, consulting, and advising leaders of nonprofit start-ups, as well as others interested in drawing upon her expertise in mentoring, the design and deployment of technology-supported mentoring systems, engineering education, and diversity. Dr. Muller developed the Women in Science Project at Dartmouth when she served as Associate Dean for Thayer School of Engineering. This and MentorNet have been recognized with the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. She was also principal in creating the Dartmouth Project for Teaching Engineering Problem Solving, and the Stanford New Century Scholars Workshop. Since 1998, Dr. Muller has been a consulting Associate Professor of Mechanical Engineering at Stanford University. An author of numerous papers and a frequently-invited speaker, she has received a variety of grants and awards, including the Anita Borg Social Impact Award, and serves on a number of boards. Dr. Muller is a graduate of Dartmouth College, where she majored in philosophy, and earned Master's and Ph.D. degrees in Education Administration and Policy Analysis at Stanford University. She currently resides in Palo Alto, California where she is President of Blue Sky Consulting, specializing in strategic planning and development to advance learning.

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**Donna Nelson, Ph.D.**

Associate Professor, Department of Chemistry, University of Oklahoma

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Donna Nelson, Ph.D., Associate Professor of Chemistry at Oklahoma University, obtained her Ph.D. in Chemistry at UT-Austin with MJS Dewar, did her postdoctorate at Purdue with HC Brown, and joined OU in 1983. Her research areas are energy and scientific workforce development, and she frequently speaks on their interrelationship. She has over 100 publications and several honors, including Fulbright Scholar, NSF ADVANCE Leadership Award, SACNAS Distinguished Scientist, Women's eNews "21 Leaders for the 21st Century" AAAS Fellow, Guggenheim Award, NOW "Woman of Courage" Ford Fellow, Sigma Xi Faculty Research Award, NSF Creativity Extension, and many keynote talks. Her chemical research involves functionalizing single-walled carbon nanotubes (SWCNTs), with applications in energy research and technology development, and yielded the first COSY NMR spectrum of covalently-functionalized SWCNTs. Her scientific workforce surveys, of faculty race/ethnicity, gender, and rank in science and engineering at research universities, revealed that women and minorities are much less represented among professors than degree recipients.

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**Maria (Mia) Ong, Ph.D.**

Principal Investigator, TERC; CEOSE Member

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Maria (Mia) Ong, Ph.D., serves as a Principal Investigator at the Education Research Collaborative and Director of the Diversity Resource Group at TERC, a STEM education research and development non-profit in Cambridge, MA. She also directs Project SEED (Science and Engineering Equity and Diversity), a social justice collaborative that is affiliated with The Civil Rights Project/Proyecto Derechos Civiles at UCLA. Dr. Ong works on qualitative research related to promoting diversity and gender equity in STEM education, with a focus on women of color in higher education and early careers. Currently, she is leading two NSF-sponsored studies on women of color in STEM: the "Inside the Double Bind" synthesis study with Gary Orfield and a new research study with Apriel Hodari, "Beyond the Double Bind," which is analyzing life stories of women of color in STEM and the programs that support their success. Dr. Ong began her career in STEM education as an elementary mathematics teacher and curriculum developer. Between 1996 and 2000, she directed an undergraduate physics program for underrepresented students at UC Berkeley; for this work, she was a co-recipient of the U.S. Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. She received, in 2002, her Ph.D. in Social and Cultural Studies in Education from Berkeley and went on to postdoctoral positions at Wellesley College and the Harvard Graduate School of Education. In 2005, she served on the U.S. delegation at the 2nd IUPAP International Conference on Women in Physics. Dr. Ong presently serves as a Member of the Social Science Advisory Board for the National Center for Women and Information Technology (NCWIT) and as a Member of the Committee on Equal Opportunities in Science and Engineering (CEOSE).



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**Muriel Poston, Ph.D.**

Dean of Faculty and Professor of Biology, Skidmore College; CEOSE Vice Chair

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Muriel Poston, Ph.D., is Dean of the Faculty and Professor in the Biology Department at Skidmore College. Prior to her appointment at Skidmore, Dr. Poston spent over twenty years as a professor in the Department of Biology/Botany at Howard, where she focused on undergraduate education, served as curator of the university herbarium, and worked to develop the environmental science program. Her primary research interests are in plant systematics, especially the evolutionary relationships of the neotropical family Loasaceae. Dr. Poston also served as a Program Director and Deputy Division Director in the Biological Sciences Directorate at the National Science Foundation where she was responsible for programs to enhance infrastructure for biological research collections, research instrumentation, and field station facilities. In addition, she worked on initiatives to broaden the participation of underrepresented groups in science and to bring more women into the fields of science and engineering. She currently serves the National Science Foundation Committee on Equal Opportunities in Science and Engineering as well as the NSF Advisory Committee for the Biological Sciences Directorate. Dr. Poston earned a B.A. degree from Stanford University, M.A. and Ph.D. degrees from the University of California at Los Angeles, and a J.D. degree from the University of Maryland.

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**Alex Ramirez, Ph.D.**

Executive Director for Information Technology Initiatives, Hispanic Association of Colleges and Universities; CEOSE Member

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Alex Ramírez, Ph.D., is the Executive Director for Information Technology Initiatives at the Hispanic Association of Colleges and Universities (HACU), the only national association of Hispanic-Serving Institutions (HSIs). HSIs are institutions with at least 25% Hispanic student enrollment, and are almost evenly split between two-year community colleges and four-year institutions. Dr. Ramírez has been in the IT field for over 20 years at the University of California, Riverside, becoming the Director of Academic Computing, before joining the University of Texas at San Antonio and then HACU. While at HACU, he has been the HSI Community Lead for the NSF Advanced Networking with Minority-Serving Institutions (AN-MSI) and Co-PI of the MSI Cyberinfrastructure (CI) Institute (MSI-CI2), and Co-PI of the MSI CI Empowerment Coalition (MSI-CIEC). MSI-CIEC is a strategic partnership similar to that of AN-MSI and MSI-CI2, of HACU, the American Indian Higher Education Consortium (AIHEC), representing the nation's Tribal Colleges and Universities (TCUs), and the National Association for Equal Opportunity in Higher Education (NAFEO) representing Historically Black Colleges and Universities (HBCUs) and predominantly black institutions. Combined, the partnership represents the vast majority of MSIs, over 330 institutions. MSI-CIEC and MSI-CI2 is also with Indiana University, the San Diego Supercomputer Center (SDSC), and the University of Houston-Downtown. AN-MSI was with EDUCAUSE, the premier association for higher education IT. Dr. Ramirez has also been with the NSF Broadening Participation in Computing (BPC) Computing Alliance of HSIs, CAHSI, an alliance of some of the leading HSIs in computing led by

the University of Texas at El Paso (UTEP), Ann Gates, PI. He also established and leads the HACU Hispanic Higher Education Research Collective (H3ERC), funded by the Lumina Foundation. In addition to currently serving on the Committee on Equal Opportunities in Science and Engineering (CEOSE), he also serves on the TeraGrid Science Advisory Board, the NSF Office of Cyberinfrastructure Advisory Committee, and the Human Resources Expert Panel of the NSF Division of Science Resources Statistics (SRS).

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**Claudia Rankins, Ph.D.**

Program Officer, HBCU-UP, Directorate for Education and Human Resources,  
National Science Foundation

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Claudia Rankins, Ph.D., is a Program Officer in the Directorate for Education and Human Resources at the National Science Foundation. She manages the Historically Black Colleges and Universities Undergraduate Program, which provides awards to enhance the quality of undergraduate science, technology, engineering and mathematics (STEM) education and research at HBCUs as a means to broaden participation in the Nation's STEM workforce. Dr. Rankins is on leave from Hampton University, where she is an endowed Professor of Physics and has held positions as Dean of the School of Science, Assistant Dean for Research, and Chairman of the Department of Physics. She also directed five summer science programs for students ranging from middle school through post baccalaureate studies. Her formal education includes military training, certification as translator and interpreter for German, French and English, a B.S. in Mathematics with a minor in Political Science, an M.S. in Statistics, an M.S. in Physics, and a Ph.D. in Physics with an emphasis in theoretical nuclear physics. From 2001 to 2008, Dr. Rankins secured over \$8 million in external grants that supported pre-college activities as well as undergraduate education and research in STEM—two areas she champions. Her current research interests focus on the issues faced by women of color in STEM disciplines in academia.

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**Marie-Elena Reyes, M.S.**

Coordinator, Water Institute for the Northern Rio Grande,  
University of New Mexico Taos

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Marie-Elena Reyes, M.S., is Coordinator for the Instituto de Agua y Cultura: Water Institute for the Northern Rio Grande at the University of New Mexico-Taos and is also the President and Founder of the Frida Kahlo Institute for Women at the Borderlands. She serves as an expert for the Engineering Equity Extension Service (EEES), and has been selected to serve on the Math and Science Advisory Council for New Mexico as an alternate. Ms. Reyes served as an Assistant Research Scientist with the Southwest Institute for Research on Women for five years at the University of Arizona, developing programs to increase the participation of women from underrepresented groups in STEM while researching methods for infusing science education with gender and multicultural perspectives. Additional projects included Frontera Grrls@ Clubs project, the National Science Foundation Futurebound Program, and Girls in the SYSTEM (Sustaining Youth in Science, Technology,

Engineering and Mathematics), an NSF-funded project. Ms. Reyes holds two Masters of Science degrees, the first in Zoology and Physiology and the second in Applied Statistics, with additional doctoral training in education. Ms. Reyes areas of expertise include recruitment and retention of girls and women of color in STEM throughout the educational K-20 pathway, transitions for women from community college to university in STEM, community-based design for retention of women in engineering, mentoring and leadership programs for women of color in STEM, and outreach STEM programs.

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**Elsa Cantú Ruiz, Ph.D.**

Assistant Professor, Interdisciplinary Teaching and Learning, University of Texas at San Antonio

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Elsa Cantú Ruiz, Ph.D., is an Assistant Professor of Curriculum and Instruction in the College of Education and Human Development with emphases in Secondary and Mathematics Education at the University of Texas at San Antonio. She has over 30 years of mathematics teaching experience, including middle, high school, and college teaching in diverse campuses. As a secondary school teacher, Dr. Ruiz taught middle school mathematics courses to 6th, 7th, and 8th graders for 17 years and high school mathematics courses for 10 years. She served as district mathematics coordinator where she provided supervision for the mathematics instruction of K-12 teachers. In addition, she was an Assistant Principal and served as the district testing coordinator, ensuring the effective implementation of the testing process for the entire district. Dr. Ruiz's research focuses on the motivation of Hispanic/Latina(o) students in secondary mathematics courses, secondary pre-service and in-service teachers' notions of motivational strategies, and the impact of teachers' content and pedagogy knowledge on student motivation and mathematical achievement. Her research focus also includes the development of culturally relevant, culturally competent pre-service and in-service teachers. She is a member of National Council of Teachers of Mathematics, National Middle School Association and TODOS: Mathematics for All and School Science and Mathematics Association. She is presently a member of the board of the Southwest Educational Research Association.

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**Valerie E. Taylor, Ph.D.**

Department Head, Department of Computer Science and Engineering, Texas A&M University

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Valerie E. Taylor, Ph.D., earned her B.S. in Electrical and Computer Engineering and M.S. in Computer Engineering from Purdue University in 1985 and 1986, respectively, and a Ph.D. in Electrical Engineering and Computer Science from the University of California, Berkeley in 1991. From 1991 through 2002, Dr. Taylor was a member of the faculty in the Electrical and Computer Engineering Department at Northwestern University. Dr. Taylor joined the faculty of Texas A&M University as Head of the Dwight Look College of Engineering's Department of Computer Science and Engineering in January of 2003, and is, also, currently a holder of the Royce E.

Wisenbaker Professorship. Her research interests are in the area of high performance computing. She has authored or co-authored over 100 papers in these areas. Dr. Taylor has received numerous awards for distinguished research and leadership, including the 2002 IEEE Harriet B. Rigas Award for a woman with significant contributions in engineering education, the 2002 Outstanding Young Engineering Alumni from the University of California at Berkeley, the 2002 CRA Nico Habermann Award for increasing the diversity in computing, and the 2005 Tapia Achievement Award for Scientific Scholarship, Civic Science, and Diversifying Computing. Dr. Taylor is a member of ACM and Senior Member of IEEE-CS.

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**Christina (Tina) Tchen, J.D.**

Director, White House Office of Public Engagement; Executive Director, White House Council on Women and Girls

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Christine (Tina) Tchen, J.D., was previously a partner in corporate litigation at Skadden, Arps, Slate, Meagher & Flom LLP. In that capacity, Ms. Tchen represented public agencies in state and federal class actions, including the Illinois Department of Children and Family Services, the Illinois Department of Public Aid, and the Chicago Housing Authority. Ms. Tchen is the recipient of many awards, including the Leadership Award from the Women's Bar Association of Illinois (1999); "Women of Achievement" award from the Anti-Defamation League (1996); and Chicago Lawyer "Person of the Year" (1994).

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**Margaret E. M. Tolbert, Ph.D.**

Senior Advisor and CEOSE Executive Liaison, OIA/OD, National Science Foundation

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Margaret Ellen Mayo Tolbert, Ph.D., earned her Ph.D. in Biochemistry from Brown University; her M.S. in Analytical Chemistry from Wayne State University; and her B.S. in Chemistry from Tuskegee University. Dr. Tolbert is a member of the Senior Executive Service of the Federal government. In 2002, she was named Senior Advisor in the Office of Integrative Activities. Prior to this, she was the first African American and the first female to serve as Director of the U.S. Dept. of Energy's New Brunswick Laboratory. Before this, she was Acting Associate Director of the U.S. Department of Energy's Office of Laboratory Operations and Environment, Safety and Health. Dr. Tolbert was also the first African American female to be Director of the Division of Educational Programs at Argonne National Laboratory; the first African American to be Special Assistant to the Vice Chairs of the Presidential Committee on Education and Technology of the Federal Coordinating Council for Science, Engineering, and Technology; the first female to be Director of the Research Improvement in Minority Institutions Program of NSF; and the first female to be Director of the Carver Research Foundation. Previously, Dr. Tolbert was appointed as a Director of the Federal Reserve System Board - Birmingham Branch. She was Senior Planner and Senior Budgets & Control Analyst at the BP America Research Center. Dr. Tolbert has served as Visiting Associate Professor of Medical Sciences at Brown University, Professor of Chemistry and Associate Provost for R&D at Tuskegee University, Instructor in Mathematics and Science at the Opportunities Industrialization Center,

and Associate Dean of the School of Pharmacy and Professor of Pharmaceutical Science at Florida A&M University. She served on proposal review panels and Committee of Visitors to several Federal agencies and private sector organizations. Also, she has been Guest Scientist at the International Institute for Cellular and Molecular Pathology. Dr. Tolbert has completed tours of duty in such countries as Ghana, Liberia, Libya, Sudan, South Africa, Senegal, Austria, and Belgium. She is a member of ACS, AAAS, New York Academy of Sciences, and the Institute of Nuclear Materials Management. She was appointed as an AAAS Fellow in 1988. Her other awards include the Women of Color in Government and Defense Technology Award in Managerial Leadership; Letter of Congratulations on Winning the Award in Managerial Leadership; Chicago-Tuskegee Alumni Club President's Merit Award; and the Secretary of Energy Pride Award for Community Service. Dr. Tolbert has served as invited speaker at numerous conferences and has published papers in peer-reviewed journals.

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**Lilian S. Wu, Ph.D.**

Program Executive, Global University Programs, IBM

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Lilian Wu, Ph.D., is Program Executive, Global University Programs, IBM Technology Strategy and Innovation and a research scientist. She chairs the National Academies of Science, Engineering, and Institute of Medicine's National Research Council Committee on Women in Science, Engineering, and Medicine and is a Councilor of the Association for Women in Science. Dr. Wu is a member of the S&E Workforce Committee of the Government-University-Industry Research Roundtable of the National Research Council; and a member of NSF's Advisory Committee on International Science and Engineering and NSF's Corporate Alliance. She received her Ph.D. in Applied Mathematics from Cornell University. Her major research interests are analysis of technology-enabled and people-intensive complex systems, particularly in the services sector. Dr. Wu is also a member of the Board of trustees of the New School University and Fordham University in New York City, and the President's Council of Olin College. She was a member of President Clinton's Committee of Advisors on Science and Technology, NSF's Committee on Equal Opportunities in Science and Engineering and served on the Advisory Committee of NSF's Engineering Directorate. Among her other professional services, Dr. Wu served on AAAS's Committee on Public Understanding of Science and Technology and DOE's Secretary of Energy's Laboratory Operations Advisory Board.

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**Patrice O. Yarbough, Ph.D.**

Senior Scientist, Division of Space Life Sciences,  
Universities Space Research Association

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Patrice O. Yarbough, Ph.D., is Senior Research Scientist at Universities Space Research Association (USRA). As Deputy Project Scientist for the Flight Analog Project at NASA Johnson Space Center, she contributes to the planning and implementing of multi-system human studies. She is Adjunct Assistant Professor of Internal Medicine in the Division of Infectious Diseases at the University of Texas Medical Branch and adjunct faculty at the University of Houston in the Biotechnology Program in the College of Technology. Prior to joining USRA, Dr. Yarbough was Interim Executive Director of the Office of Strategic Research Collaborations at the University of Texas Medical. Previously, she was Director of Research Projects Administration at Tanox, Inc. She later joined the Clinical Development Department and managed and executed the conduct of clinical trials in immunology and infectious disease. Earlier in her biotechnology career, Dr. Yarbough was principal investigator at Genelabs Technologies Inc. on two Small Business Innovative Research (SBIR) programs while researching the hepatitis E virus. Dr. Yarbough is the co-inventor on eight U.S. patents for HEV sequences, proteins, vaccines and methodologies, and she has published over 40 manuscripts and book articles on hepatitis E. She was the recipient of the Beatrice Vitiello COPEV Young Investigator Award in 1996 for research conducted on the prevention of viral hepatitis. Dr. Yarbough holds a Doctorate and Bachelor's degree with honors in Biochemistry from the University of Houston and was a NIH Fellow at the University of Texas Southwestern Medical Center in Dallas. Dr. Yarbough serves on the Just Garcia Hill Executive Committee, a national organization for minorities in science. She is a member of the Association for Women in Science (AWIS) and chairs the AWIS Diversity Task Force.





Row 1: Muriel Poston and Sandra Begay-Campbell; Catherine Didion and Joseph Francisco; Janet Bryant; Usha Narayanan, LaRuth McAfee and Beverly Hartline.

Row 2: Wesley Harris and Joseph Francisco; Akilah Moore and Sheila Lange; Attendees at Evening Reception.

Row 3: Luis Echegoyen and Joretta Joseph; Katherine Hoffman, Constance Thompson, Ingrid Montes, Janet Bryant, Lily Ko, Ebony Roper and Gloria Thomas; Norma Cantú and Mia Ong.

Row 4: Evelyn Hammonds, Valerie Taylor, Gillian Bayne, Theda Daniels-Race and Joretta Joseph; Robert Barnhill and Marigold Linton; Patricia Campbell, Lilian Wu and Mamie Moy.

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